MAY 1941

50th ANNIVERSARY YEAR

ARCHITECTURAL RECORD

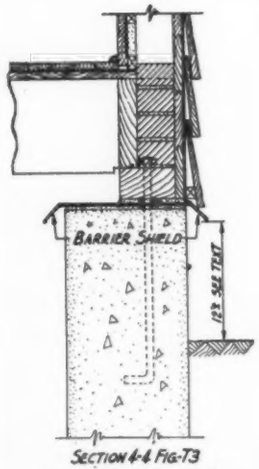
HOUSES

SAFETY IN THE HOME

LARGE-SCALE HOUSING

THWART RETICULI TERMES* WITH COPPER

*Subterranean termites



SECTION 4-4 FIG-T3
FRAME CONSTRUCTION

Typical Foundation Wall for frame construction—with Shields of Anaconda Copper

Durable copper shields between masonry and wood provide efficient, inexpensive protection against termites

The spread of the wood-eating termite's natural *habitat* has aroused considerable interest . . . particularly in precautionary measures to safeguard building construction against termite damage.

It is generally conceded that properly formed, rustless sheet copper shields offer the most effective and most durable protection. Installation is a relatively simple sheet metal job, the cost being comparable with that of an equal amount of roof flashing.

Highly Informative Booklet—The American Brass Company has published a digest of pertinent information on the use of shields for termite protection. A free copy will be mailed promptly on request. 4178

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Anaconda Copper

ARCHITECTURAL RECORD

COMBINED WITH AMERICAN ARCHITECT AND ARCHITECTURE

Next Month

BOSTON, New York and Philadelphia are the metropolitan centers of three great areas, rich in their own historic contributions to American architecture. The most famous structures have served for centuries as prototypes. But of special interest to architects are the significant advances in design and construction technique achieved in these regions. In the June RECORD, Professor Turpin C. Bannister of Rensselaer Polytechnic Institute makes a study of historically important buildings of all periods in these three regions. He relates each building to the past, and to succeeding architecture, and the result is a remarkably clear-cut history of building design in Northeastern and Eastern Central United States. The study will be lavishly illustrated by photographs, drawings and reproductions of old lithographs.

News features will include a New York department store that has built a large suburban apparel shop. This shop, accessible from several sizable towns, has ample parking space and a two-story-and-penthouse design that permits outside entrance to both main floors from ground level. Four small professional buildings, a monastery church by Cram and Ferguson, and a bank remodeling project complete this section.

Schools—nursery, primary, elementary and secondary—are the subject of the Building Types Study. There'll be a new high school in California, excellent by all standards, a plywood school in Connecticut, and others. Time-Saver Standards will be on the new type of activity classrooms which are becoming increasingly common; and on stadium seating (a continuation of data in the April Time-Savers).

We're planning four pages of details on built-in furniture, as well as news of books, materials and the other departments.

VOLUME 89 MAY 1941 NUMBER 5

NEWS AND TRENDS

★

PLANNED LARGE-SCALE HOUSING . . . A BUILDING TYPES STUDY

★

Editorial Director: Thomas S. Holden. *Editors*: Roger Wade Sherman, A.I.A. (*Managing*), James M. Fitch, Jr. *Associate Editors*: Elisabeth Kendall, Frank G. Lopez, Jr., George A. Sanderson. *Art Director*: Gene Hawley. *Desk Editor*: Catherine Woolley.

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Manuscripts, photographs, and drawings which conform to RECORD'S editorial aims are welcomed. Every effort will be made to return material (if accompanied by stamped, addressed envelopes); but the editors will not be responsible for losses.

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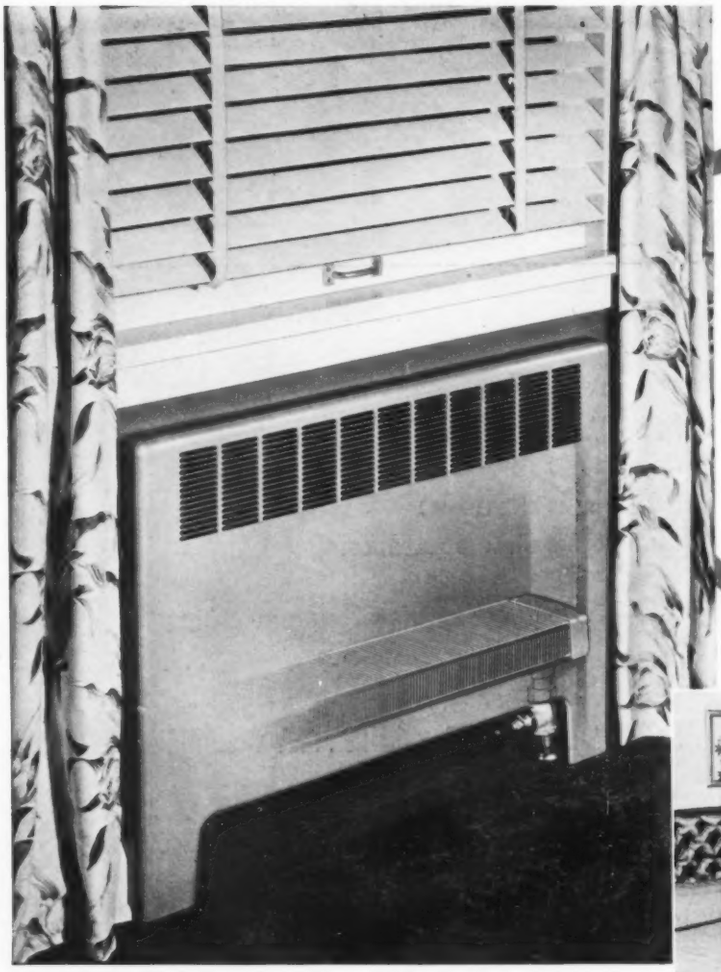

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Top: View of Modine Convector showing copper heating unit as concealed behind Panel Front Recessed Type enclosure.

Right: Attractive Modine enclosures blend harmoniously with decorations and furnishings of any room.

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BEHIND THE RECORD

Our desk has lately been heaped with mail anent "The Architect in Action"—the Golden Jubilee Feature of the March issue. From the start we've thought of it as a sort of public relations piece for the entire architectural profession. So we took it upon ourselves to see that it came to the attention of a part of the public who, we thought, ought to become more than casually familiar with architects and the value of their services. Accordingly, we sent more than 750 marked copies of the March issue to an "official family" list that included all U. S. Senators, State Governors and a large number of executives connected with planning, design and construction activities in governmental agencies. We've not space to quote all of their comments, but the following two are typical of the interest that "The Architect in Action" is generating:

* * *

Thank you for the copy of the March ARCHITECTURAL RECORD. I read it with a great deal of interest and am very glad to have the valuable information presented. We do not have to look far to see the many fine contributions that members of the architectural profession have made to our standard of living. Wonderful progress has been made and I was happy to have the opportunity to see the numerous examples of it contained in the ARCHITECTURAL RECORD.

I was particularly interested in the article entitled "The Architect in Action." Undoubtedly, American architects can render useful service in our national defense program.—*Arthur Capper, U. S. Senator from Kansas.*

* * *

The crying need today in virtually all of our offices is more architects. As a matter of fact our work in a number of offices is being hampered by the lack of good architectural inspectors and I hope the article may furnish me some kind of solution.—*Abner H. Ferguson, Administrator, F.H.A.*

The Government's attitude toward architects in the current emergency has lately been the subject of some heated controversy. The following comment from *Albert Kahn* of Detroit takes a calm, realistic and understanding view of the situation:

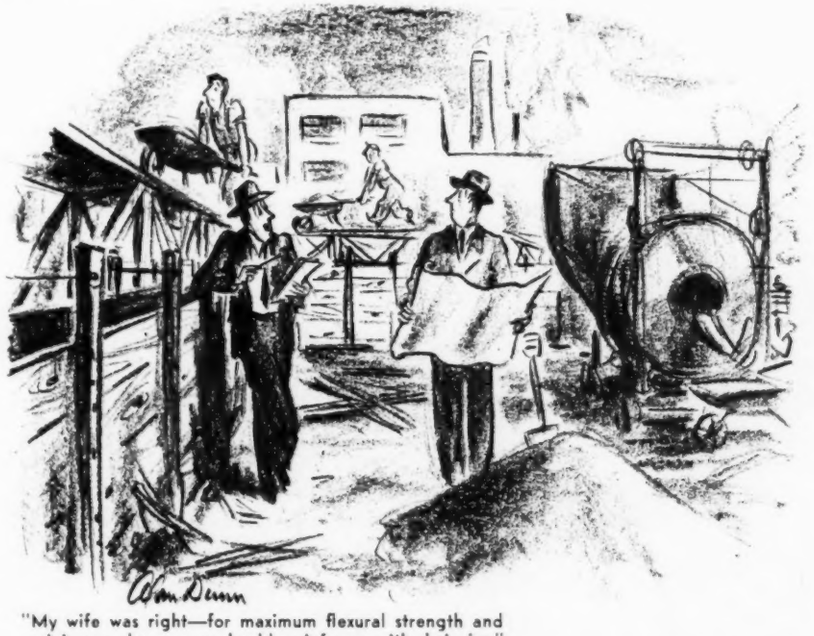
Considerable criticism is being directed by the architectural profession at some of the Governmental departments for the method employed in obtaining architectural services in connection with the Defense program. While, in most cases, architects and contractors are selected simultaneously, considerable work is being given to contractors who are asked to furnish the plans as well as do the construction work. It is the latter which is objected to.

It is not difficult to understand why the objectionable method is often resorted to. The saving of every minute's time is imperative. The gigantic task ahead demands concentration of responsibility. By placing all in the hands of a contracting firm, Government officials believe they are saving time. In some instances, this may prove to be the case. In the main, however, it will prove a fallacy—particularly, if the architectural work is prepared by the contracting firm itself. Few have architectural staffs and must depend upon such talent as happens to be available in the open market. A heterogeneous group thus assembled cannot possibly compare with an organization that has co-operated for years and devoted itself continuously to planning and engineering. For this reason, then, the employment of a capable architectural firm by the contractor selected should be insisted upon. The fact that outstanding contracting firms known for the best grade of work and excellence of management will not themselves undertake architectural work, but will call in qualified architects, is ample proof of the advisability of following this plan.

Placing contracting firms in charge is entirely logical under existing conditions. They are better organizers than most architects, and organization is the prime factor in speedy construction. The architect may dislike working in a minor role and under the direction of a contractor. It may somewhat hurt his pride, but what of it? These are not normal times and old methods cannot apply. Professional pride must give way to efficiency.

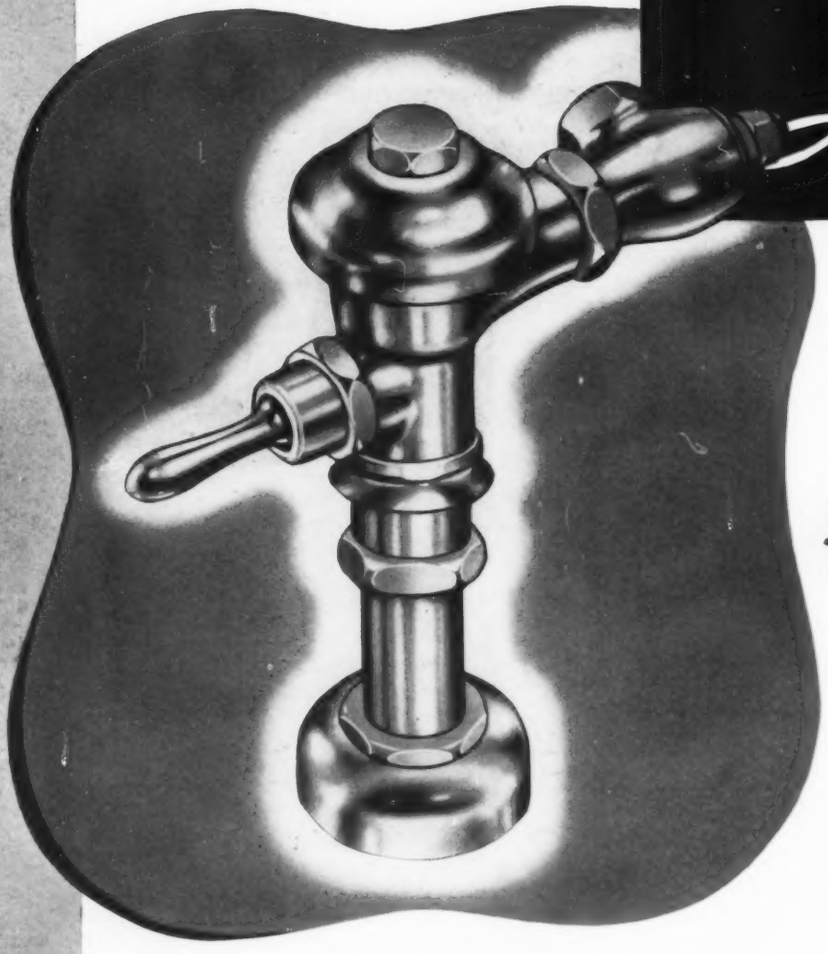
Some RECORD reader with a penchant for book collecting may be interested to know that *William Swan* of Touchwood, Punnichy, Saskatchewan, has a copy of "Nicholson's Book of Lines, A Carpenter's Guide." Mr. Swan says the volume is full of plates, showing the geometrical principles upon which various architectural and structural problems are worked out. It was published by Jones & Co. of London in 1825.

We're chagrined to learn that *Lester C. Tichy*, New York Architect, should have been credited with the remodeling of Macy's of Syracuse (AR 1/41, p. 116). *Raymond Loewy*, though a capable designer, is not a registered architect, and as his business associate Mr. Tichy was the architect of record on this job.



"My wife was right—for maximum flexural strength and minimum shear you should reinforce with hairpins."
—Drawn for the RECORD by Alan Dunn

Are SLOAN F



Take University o

Here is the testimony of 27 years continued use, year in and year out. Some of the original valves are still in service, a remarkable record for hand-operated public equipment subjected to severe daily use—and abuse.

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1 Sloan *enduring satisfaction* can be verified by you in *your* locality. Installations fifteen, twenty or twenty-five years old are common to every section of the country and to every type of building. We will gladly supply a list of old installations in your city which you can personally inspect.

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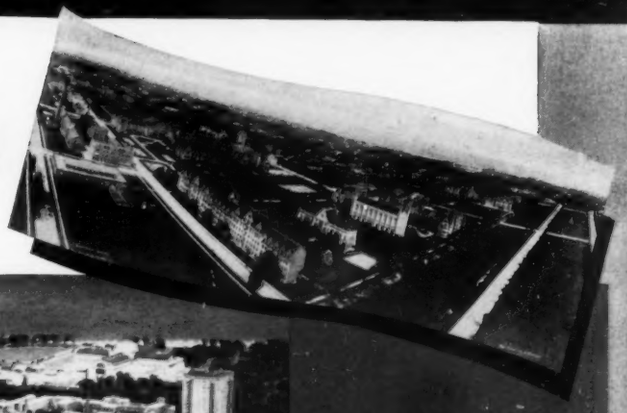
sity of Chicago for Example



The University of Chicago

. . . as it looked 27 years ago and as it looks today. The older photograph above was taken from a box kite. The camera was hauled up a kite string and as the camera reached the kite it ran over a catch which tripped the shutter and exposed the plate.

In the modern photo 33 of the imposing new buildings are SLOAN equipped.

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N *Quiet Flush* VALVES

WITH RECORD READERS

Photo by Peter A. Juley & Son

Portraits of 110 living Bostonians appear in these murals showing present-day customs of Boston. The murals were done in varnished tempera by *Francis Scott Bradford* for the lobby of the Lever Brothers' Company administrative building, Cambridge, Mass. Each painting depicts an occasion, and the actual participants. The three murals shown represent Harvard University, Christmas Eve in Louisburg Square, and Skating in the Public Gardens. Architects: Donald Des Granges, Shreve, Lamb & Harmon

Quick Action by Architects on Civilian Defense Measures Called Essential Preparation by Connecticut Chapter of AIA

IMMEDIATE ACTION by architects on certain procedures for civilian defense has been called for by *George H. Gray* of New Haven, Conn., chairman of the Committee on Civil Defense of the Connecticut Chapter of AIA, who asserts that architects are the group best prepared to carry out a program of protective measures. Although studies are being made by the Army staff in Washington, and will be available in due time to state and municipal defense bodies, Mr. Gray points out, surveys of existing conditions preparatory to an emergency are essential.

The inflammable construction of large areas of our cities makes it necessary, he believes, to plan for demolition strips separating various parts. He sees the need of providing shelter for the dehoused. His plan would embrace the following program:

"First, to make a survey and report on both demolition areas and new habitations. Second, to select, in conjunction with engineers, existing structures for air-raid shelters and for first-aid and other emergency depots. Third, to plan for the protection of those assembled in public places, especially pupils and teachers, through disciplinary measures and selection of existing space for air raid shelter or special construction. Fourth, to draw up plans for separating the population from the proximity of military objectives."

A study of how best to separate the population from military objectives has been made in the New Haven area by graduate students at the Yale School of Architecture under the direction of Professor *Andrew Euston* of the defense committee. The protection of public assemblies is being investigated by *John Nichols* of Hartford, architect to the State Board of Education, and *Ernest Sibley*, school architect, of Litchfield.

Advance in City Plan Technique Seen In Redesign of New York's Battery Park

"THE ADAPTATION of our cities to modern life makes it necessary for architects to consider more than the design of individual buildings. The planning of groups of buildings is becoming more and more important."

So spoke *Eli Jacques Kahn*, chairman of the Civic Design Committee of the New York Chapter of AIA, in announcing that his committee had commissioned *James C. Mackenzie*, New York architect and president of the Fine Arts Federation, to execute a comprehensive plan for redesign of the Battery Park area of New York City. Construction of the new Battery-to-Brooklyn traffic tunnel has raised issues concerning disposition of the Aquarium, design of ventilating towers for the tunnel and rehabilitation of the Park, and proper solutions can be reached only after they have been studied in relation to one another and to the needs of the district as a whole, according to Mr. Kahn. His committee sees Mr. Mackenzie's role as correlator, not only of the design of buildings and structures in the district, but of the varied interests working at cross purposes.

Mr. Mackenzie will be able to call to his assistance architects and engineers who will act in concert with him, assuming responsibility for the design of individual buildings.

The Civic Design Committee was organized in 1938 through a contribution of *Nelson Rockefeller*, to make studies and surveys for the benefit of the city.

Leventritt Collection at Stanford

THE MORTIMER C. LEVENTRITT Collection of Oriental and Venetian Art, donated to Stanford University on the occasion of its 50th anniversary, was formally presented to the public April 20 at the Thomas Welton Stanford Art Gallery. In addition to

(Continued on page 12)

G-E HOME WIRING

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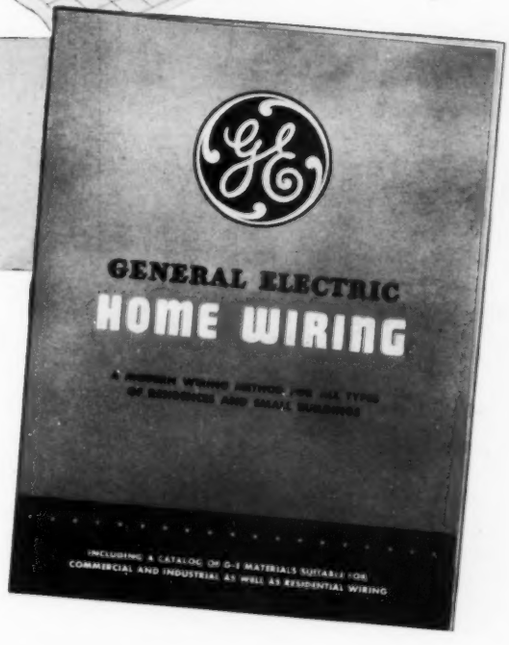

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General Electric wiring materials are ideal for this up-to-date wiring. The line is complete. The materials are high quality and are designed to be used together.

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FOR INDUSTRIAL WIRING

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Address.....

City..... State.....

GENERAL ELECTRIC

WITH RECORD READERS

(Continued from page 10)

works of art assembled by Mr. Leventritt, a Stanford alumnus, over a period of more than 30 years, the collection includes an excellent art reference library, housed in the same building.

The collection of Venetian furniture, never before shown to the public, is said to be without rival in this country, and is supplemented by a group of paintings that include works of Guardi, Marieschi, Pietro Longhi, Domenico Tiepolo, Giovanni Battista Tiepolo and Piazetta. The Chinese collection is especially rich in works exemplifying the affinity between the arts of China and those of Venice. It dates back to a perfect example of prehistoric pottery, adorned with geometric design, and includes bronzes and porcelains. In charge of the installation were Dr. *Annemarie Henle*, Professor *W. S. Wellington*.

Exhibitions

EDUCATION of an architect will be graphically represented at the City Art Museum, Forest Park, St. Louis, from May 15 to June 1, under the auspices of the Washington University School of Architecture and Ipsamboul Chapter, Scarab Fraternity. Sequence, content and coordination of the studies which enter into an architect's training will be illustrated by means of rendered projects, structural drawings, models, water colors, delineation and diagrammatic material, to show interrelation of the courses with each other and with professional practice. The exhibit will also emphasize to the public the importance of an architect's services.

Professors *Lawrence Hill*, *Joseph Murphy* and *A. E. Fitch*, and *Robert Fischer*, student representative, are in charge.

* * *

DESIGN from earliest times to the present is surveyed at the Baltimore Museum of Art in an exhibition on view until May 25. Opening with scenes of Indian life, the exhibits picture design characterizing the periods spanned by the Agricultural and Industrial Revolutions. The "Design Decade" of 1930 to 1940, which lends the exhibition its name, is shown under such heads as Education, Recreation, Health, Transportation and Communication, Government, Work and Home, with attention directed to pioneers, such as *Richardson*, *Sullivan*, *Wright* and *Stieglitz*, who became aware that there was no inherent antagonism between beauty and the machine. Corollary to the main exhibit, *Walter Dorwin Teague* shows some of his original designs and their machine-made results.

* * *

FROM the collaboration of architect and engineer, in TVA's vast development, with its 10 dams and their surrounding control buildings, power plants, visitors' buildings and employee housing, a basically modern architecture has evolved. And this architecture is being shown, in photograph and model, until June 8 at the Museum of Modern Art, New York City. Graphic diagrams show the engineering control over the 700-mile Tennessee River and its effect on the valley, an area larger than England. The exhibition was prepared by the Tennessee Valley Authority in collaboration with the Museum.

Summer Sessions

A COUNTRY SESSION at the School Farm, Somonauk, Ill., and a city session at the School, near Chicago's Loop, are offered by the School of Design in Chicago for creative workers in architecture, art, design and teaching. Registration will be June 23 at the former, June 16 through June 21 at the latter. *George Fred Keck* is head of the Department of Architecture.

* * *

INTERIOR ARCHITECTURE and decoration will be surveyed in a course offered by the New York School of Fine and Applied Art, to begin July 7. *William Pahlmann*, Director of Interior Decoration at Lord & Taylor,

(Continued on page 14)

MAKE THIS TEST — Prove BRIXMENT is BEST!

1

Take some Brixment mortar and some 50-50 lime and cement mortar. Try shoving a full head-joint with each mortar. You'll find that with the Brixment mortar

2

(1), it is much easier to shove the brick accurately into place, with a full head-joint, than it is to do the same thing with the other mortar (2).

BRIXMENT *Makes a More PLASTIC Mortar!*

One of the most important characteristics any mortar can possess is *plasticity*. Within certain limits, plasticity is the greatest single factor not only in the *economy* of the brickwork, but also in its strength, its neatness and its resistance to the passage of water.

One of the most outstanding characteristics of Brixment mortar is its unusual plasticity. For nearly twenty-five years, bricklayers all over the United States have agreed that the working qualities of Brixment are comparable to those of straight lime putty. This exceptional plasticity makes it easy for the bricklayer to secure neat, economical brickwork, with the brick properly bedded, and the joints well filled. And because of this unusual plasticity, a bag of Brixment will carry three full cubic feet of sand and still make an ideally workable mortar.

BRIXMENT

For Mortar and Stucco

Louisville Cement Company, Incorporated, Louisville, Kentucky. Cement Manufacturers for Over a Century.

WITH RECORD READERS

(Continued from page 12)

New York, will be a member of the faculty.

* * *

ELEMENTS OF DESIGN and Theory of Architecture, Introduction to Construction, Materials of Construction, Freehand Drawing, and Architectural Design are five courses to be offered a limited number of students in a six-weeks course beginning July 6, by the Department of Architecture, Syracuse University. Professor *L. C. Dillenback* heads the department

* * *

CITY AND REGIONAL PLANNING will be the subject of a short course offered at the school of Architecture of Massachusetts Institute of Technology, Boston, in collaboration with the American Planning and Civic Association, beginning July 7. Applications should go to Professor *Frederick J. Adams*.

Scholarships

CRANBROOK Academy of Art, Bloomfield Hills, Mich., will award a limited number of resident scholarships on a competitive basis, for study in its Advanced Departments of Architecture, Sculpture and Painting, for the school year of 1941-42. Further information may be had by addressing *Richard P. Raseman*, Executive Secretary, before June 2.

* * *

WOMEN not over 23 years old are eligible for a scholarship covering one year's tuition at Lowthorpe School of Landscape Architecture, Groton, Mass. Theme for the competition: design for development of a small suburban property, to be submitted by June 2.

Organization Notes

C. WILLIAM PALMER of Detroit was elected president of the Michigan Society of Architects at the 27th annual meeting, held March 21 at the Hotel Statler, Detroit. Highlight of the business session was the report of *Leo M. Bauer*, chairman of the Committee on Practice. His proposed code stipulates that no one shall represent himself as an architect if he holds commercial interest in labor or material; that all drawings for buildings shall be complete; that no architect shall also be a builder.

Photo by John S. Coburn

C. William Palmer

* * *

AMONG the membership of the San Francisco Architectural Club, "for the first time in many years," there appears to be no unemployment. Requests for draftsmen have been filled from non-members, according to *Gerry Holt*, publications chairman.

* * *

GEORGE A. BOEHM has been elected president of the Westchester County (N. Y.) Society of Architects, succeeding *Kenneth K. Stowell*.

New Addresses

THE RECORD publishes changed and new addresses only on submission, making no attempt to keep a day-by-day account. The only organization in the country with facilities for doing this is **Sweet's Catalog Service**, whose painstakingly maintained list undergoes an average revision of 23 changes for every working day in the year. Below are the new addresses recently brought to our attention:

FELIX AUGENFELD has been granted an Architect's license and has moved his office to 250 E. 43rd Street, New York City. . . . *Eugene* and *Max Fuhrer*, Architects and Engineers, announce the removal of their offices to the Burnham Building, 160 N. La Salle Street, Chicago. . . . *Thomas Stapleton*, Architect, is now located at 250 Park Avenue, New York City.

CORONADO

BATHROOM ACCESSORIES

A NEW LOW COST LUXURY LINE

Styled in Hollywood

HALL-MACK, famous for quality, now makes it possible for you to specify luxury accessories in the low cost home. Coronado fixtures are sturdy, massive, heavily chrome-plated—and so smartly designed that they provide a note of distinction at a cost of less than half that of other luxury accessories now on the market. The Coronado concealed locking device, patent applied for, holds the fixtures firmly in place, with no screws showing. Specify Coronado, by Hall-Mack, on your next low cost home—for the quality accents that mean so much to your clients.

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No. 694—¾" Square Chrome Bar	$1.70	$1.85	$2.00	$2.25
No. 695—¾" Round Chrome Bar }	$1.60	$1.70	$1.80	$1.95
No. 696—¾" Round Crystal Bar }				

GLASS SHELF

	18"	24"	30"
No. 601—5" Crystal Shelf	$1.85	$2.00	$2.25

SOAP HOLDER
No. 620 — $ .85

HOOK
No. 681
$ .45

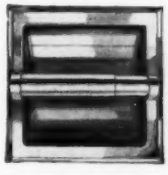
TUMBLER & TOOTH BRUSH HOLDER
No. 630 — $ .85

PAPER HOLDER
No. 670..... $1.60
No. 671..... $1.25
(Wood Roller)

SOAP HOLDER
No. 625 — $2.30

TOOTH BRUSH HOLDER
No. 650 — $ .50

TUMBLER HOLDER
No. 645 — $2.05



PAPER HOLDER
No. 675 ..... $2.45
No. 676 (Wood Roller) $2.10

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SOAP & GRAB
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ARISTOCROME

Turned at the Touch of a Finger
No. 338

The line of beauty for upper bracket homes. Rich simplicity characterizes the design of these heavily chrome-plated forged brass fixtures. The complete Aristocrome line of accessories includes the patented Concealed Lavatory Unit, shown at left, in which soap, tumbler and toothbrushes are hidden behind a revolving panel which is flush with the wall when not in use.

BE SURE TO SEE THE FULL HALL-MACK LINE IN SWEET'S CATALOG—36 pages of quality bathroom accessories and cabinets, with complete descriptions and installation data. Write direct to us at LOS ANGELES (Dept. 101) for leaflet describing and pricing the Coronado line which is so new we have not yet had time to incorporate it in our Sweet's Catalog.

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NEWS FROM WASHINGTON

BUILDING GEARS ITSELF TO LONG EMERGENCY

Years more of emergency. . . . Defense housing funds. . . . New FHA program. . . . Construction unaffected by price control. . . . Congressional investigations

—By KENDALL K. HOYT

THE DEFENSE EMERGENCY is no longer looked upon as of short duration. Official statements are beginning to prepare the public for the realization that we are in for several years of it. The diversion of manpower and productive capacity from civilian uses to the war machine, and the Federal controls which will reach further and further as this change goes on, are only beginning to be felt. The construction industry, with all other elements of our national economy, is called upon to gear itself to this new state of affairs.

Meanwhile, there is agreement among observers here that the construction outlook throughout 1941, beyond which the hardiest forecasters are reluctant even to guess, is brighter than for any year since 1929. Estimates for new housing, which have run in the magnitude of 600,000 dwelling units as against 540,000 for last year, may have to be revised upward.

The coming impetus of the defense program may be realized from the fact that of more than 40 billion dollars in appropriations thus far in sight, only about a third of the contract volume has been let. Direct outlays for construction to be appropriated in the current session will top the 4 billion mark, not to mention indirect effects on plant construction.

Build now or when?

Swelling this volume is a widespread feeling among average citizens as well as among industrialists—a feeling dictated by foresight rather than by panic—that it is time to build now while labor and materials are still available and before prices go sky winding. While officials seem to think that price inflation can be checked as far as the situation can now be foreseen, and while most building materials are available in abundance, bottlenecks as to labor are to be expected before many months.

Probably there is no better time than now, in the immediately predictable future, for architects to sell their services in the planning of modern construction which will stand as a sound investment by the purchaser. There has been no intimation yet that, in the current upsurge of activity, over-building has resulted in any wide area. Expansion in the defense program has taken up the slack where temporary saturation points have been reached.

It is to be expected that new regions will begin to benefit due to the insistence of Washington that defense plants be built inland, within an interior "strategic area" some 250 miles from the oceans and the Gulf of Mexico. The policy of avoiding new plant construction for products which can be supplied from existing plants is to some extent a check on industrial building though not on housing, which goes wherever production springs up. The field offices to assist in work spreading are at last being set up in the Federal Reserve banks and branches where information as to defense work can be secured. For information as to contract opportunities, it is better to deal with field representatives than to come to Washington. Though the Navy is still somewhat centralized, the Army is working through its corps area offices. Even old-time Congressmen complain they can find out little about pending contracts.

Despite the work spreading idea, the main plant effort is doubtless still ahead after the present period of comparative lull, awaiting availability of new appropriations, the completion of lend-lease act procedure, and the fixing of over-all policies as determined by the trend of the war.

Defense housing funds

Delayed in the Senate, the House-approved bill authorizing a second $150 million for defense housing under the Lanham Act was held during the Easter recess. As this is written, differences between the House and Senate drafts remain to be adjusted in conference committee.

Main change was the Taft amendment allowing a unit cost of $3,500 per house at the discretion of the Administrator, rather than the previous $2,900 set as the ceiling for the average cost per house in the whole program. Purpose is to permit the use of brick and other permanent types of construction where the need for housing is likely to continue beyond the emergency. The House limitation on the installation of movable equipment such as electric refrigerators is being retained.

The other Lanham bill to provide $150 million for public facilities in defense areas is still holding in the House Committee on Public Buildings and Grounds although hearings were completed several weeks ago.

Administrator *Carmody* recently reported that 96.5 per cent of the defense housing work in the continental United States is on schedule. This includes all the PBA and USHA work under Lanham Act and War Department funds. Progress in the territories is a little further behind due to lack of shipping.

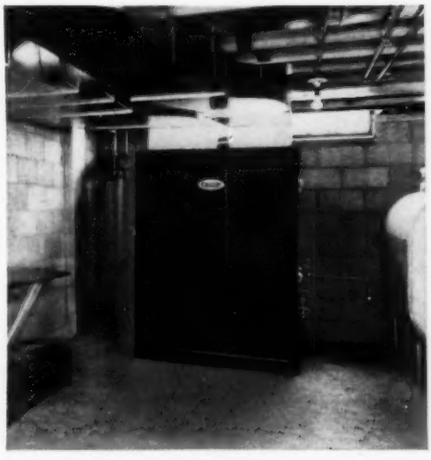
Despite all the efforts to promote prefabricated construction on the big projects, prefab units are under construction only at San Diego, Indian Head, and at a small project at Fosters Island, N. Y. In the rush of the first wave of defense housing, prefab plans for other sites could not match the speed or meet the price of conventional building methods.

Now that the program is moving at a more even pace, with more

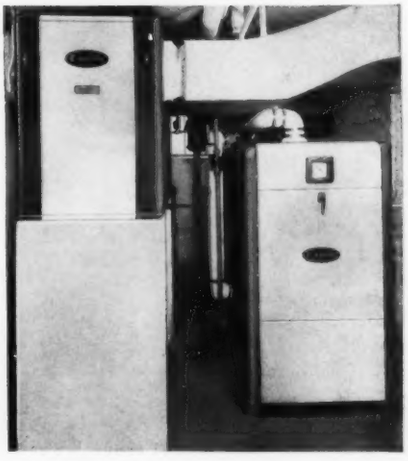
(Continued on page 120)

Now— Home Heating and Air Conditioning *From One Source* Carrier

SMALL HOME. An oil-fired Weathermaker in the kitchen of a small home without basement. Yes, ample space is available for later addition of cooling. Although built with typical Carrier quality materials and engineering skill, this Weathermaker is low in cost—for homes in the $5000 class.



MEDIUM HOME. Typical installation of Carrier Gas-Fired Home Weathermaker in an average sized home. Provides complete winter air conditioning, including heating, humidifying, filtering and constant air circulation. What's more, when the owner wants to add summer air conditioning, Carrier cooling can be installed without unnecessary extra expense.



LARGE HOME. A complete Carrier job! Carrier Boiler-Burner Unit (at right) supplies heat for direct radiation to all service rooms while Carrier Home Weathermaker furnishes clean, properly humidified air to selected rooms, such as master bedrooms, the nursery and living room. *Plus*, automatic year-round domestic hot water.

For Every Job on your Boards....

If it's a question of comfortable air conditions, call Carrier. Automatic Boilers? Carrier supplies them all — oil, gas, or stoker types. Air conditioners? Carrier meets all demands—boiler combinations with indirect units, or direct-fired types. (Note: Years from today, when your client adds summer cooling, he can go to Carrier — get refrigeration machinery that "matches" his existing equipment.) Carrier's 39 years of exclusive experience in all phases of air conditioning are entirely at your disposal. Use it — phone your Carrier dealer right now, or send in coupon.

CARRIER CORPORATION, Desk E-28
Syracuse, N. Y.
"Weather Makers to the World"
(In Canada: 30 Bloor St., West, Toronto, Ont.)

Please send me your latest Carrier Specification Sheets describing in detail the Carrier Home Heating and Air Conditioning line.

Name.....

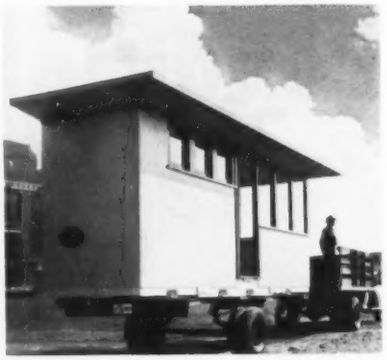
Address.....

City.....

TRENDS IN BRIEF

TVA Develops Factory-Built House

From the Muscle Shoals machine shop of the Tennessee Valley Authority the houses are transported 60 miles to Pickwick Dam, one section at a time, in a standard trailer. Turned out by production-line methods, two duplex cottages, or eight sections, can be manufactured simultaneously. Every section is mounted on small wheels and can be rolled from one point to the next in production. 12 to 16 working hours' time is required to complete a section. Cabins were produced by building trades craftsmen, at prevailing wages.



Every section contains one complete portion of the building—floors, walls, ceiling and roof, with electric wiring, light bulbs, plumbing, bathroom and kitchen fixtures, windows, screens, doors, kitchen cabinets, electric cooking plate, and refrigerator. Smaller cottages are in three sections, larger cottages in four. Each section is 7½ ft. wide, 22 ft. long, 9½ ft. high, and weighs about three tons. Sections are fitted together with bolts. Construction is wood frame, with exterior of weatherproof insulating fibreboard. Four workmen can assemble the sections within four hours. The only parts constructed on the ground were supporting cinder-block piers.

The single cottage consists of combination living and bed room, kitchen, bath, small bunk room and screened porch. The larger cottage is duplex, and on each side of the central partition is one large room, kitchen and bath. Exterior color combinations used are buff with tan or gray with green. Development of the portable cottage was originated by Louis Grandgent when he was connected with TVA as Chief of the Architectural Section. It was fully developed by Harry Gurnee, George Richardson and Woodruff Purnell of the architectural staff of the Authority under the supervision of Carroll A. Towne, with the assistance of the construction staff under W. B. Richardson. Roland Wank acted as consultant and Mr. Grandgent has been retained in a consulting capacity by TVA for the portable-cottage development.

Teaching Emphasizes Technical and Economic Change, Say School Heads

EMPHASIS on the technical and economic aspects of architectural training has replaced emphasis on the purely esthetic side, according to a survey recently completed by AIA to determine "the philosophies underlying the teaching in schools of architecture." Heads of 40 eastern schools outlined objectives of their educational programs.

"Architecture," according to Dean *Leopold Arnaud* of the Columbia University School of Architecture, "takes form according to the needs of society. We are in the midst of great social change, inevitably apparent in contemporary architecture. A school devoted to training architects must combine, through its curriculum, principles of stability with flexibility, so that permanent values will not be lost, while current problems will be given their proper significance."

Utilitarian considerations basic

Historic styles should be studied primarily for exemplification of architectural values, Dean *Everett B. Meeks* of the Department of Architecture, Yale University School of Fine Arts, declares. "Utilitarian considerations, such as functionalism of plan and structure, logical use of materials old and new, simplicity and economy, should be emphasized as basic to the architect's problem."

Harold Bush-Brown, head of the Department of Architecture, Georgia School of Technology, says: "Great architecture is the outgrowth of intelligent use of available materials."

"The architect's first interest," asserts *W. Frank Hitchens*, head of the Department of Architecture at Carnegie Institute of Technology, "must be in solving problems facing his generation. He must assume an active part in directing the profession to its most useful place."

Dean *Walter R. MacCornack* of the School of Architecture of Massachu-

(Continued on page 124)

CURRENT TRENDS OF BUILDING COSTS

Compiled by Clyde Shute, Manager, Statistical and Research Division, F. W. Dodge Corporation, from data collected by E. H. Boeckh & Associates, Inc.

CURVES INDICATE trend of the combined material and labor costs in the field of residential frame construction. The base line, 100, represents the U. S. average for 1926-1929 for residential frame construction.

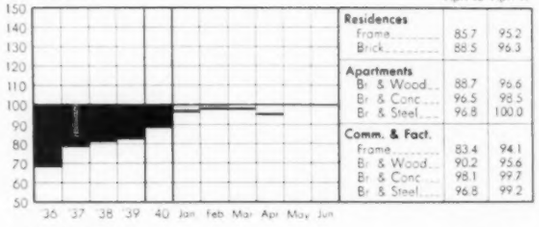
Tabular information gives cost index numbers for the nine common classes of construction. The base, 100, in each of the nine classes represents the U. S. average for 1926-1929 for each particular group. The tables show the index numbers for the month for both this year and last.

Cost comparisons, as percentage differences for any particular class of construction, are possible between localities or periods within the same city by a simple process of dividing the difference between the two index numbers by one of them. For example: if index for city A is 110 and index for city B is 95 (both indexes for A and B must be for the same class of construction), then costs in A are approximately 16% higher than in B $\left(\frac{110-95}{95} = 0.158\right)$. Conversely it may be said that costs in B are approximately 14% lower than in A $\left(\frac{100-95}{110} = 0.136\right)$.

Similar cost comparisons, however, cannot be made between different classes of construction since the index numbers for each class of construction relate to a different U. S. average for 1926-1929.

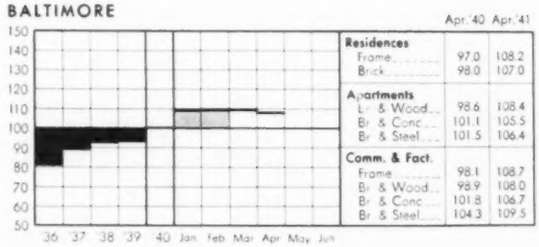
CONSTRUCTION COST INDEX United States average including materials and labor, for 1926-1929 equals 100

ATLANTA



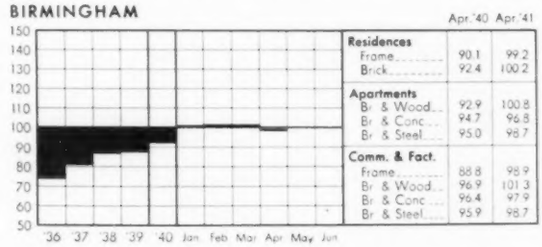
	Apr.'40	Apr.'41
Residences		
Frame	85.7	95.2
Brick	88.5	96.3
Apartments		
Br. & Wood	88.7	96.6
Br. & Conc.	96.5	98.5
Br. & Steel	96.8	100.0
Comm. & Fact.		
Frame	83.4	94.1
Br. & Wood	90.2	95.6
Br. & Conc.	98.1	99.7
Br. & Steel	96.8	99.2

BALTIMORE



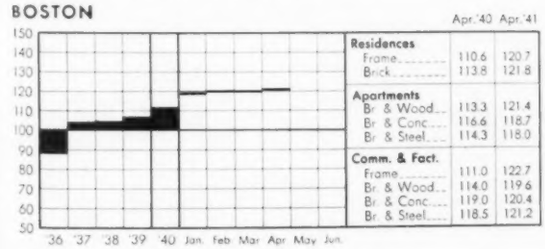
	Apr.'40	Apr.'41
Residences		
Frame	97.0	108.2
Brick	98.0	107.0
Apartments		
Br. & Wood	98.6	108.4
Br. & Conc.	101.1	105.5
Br. & Steel	101.5	106.4
Comm. & Fact.		
Frame	98.1	108.7
Br. & Wood	98.9	108.0
Br. & Conc.	101.8	106.7
Br. & Steel	104.3	109.5

BIRMINGHAM



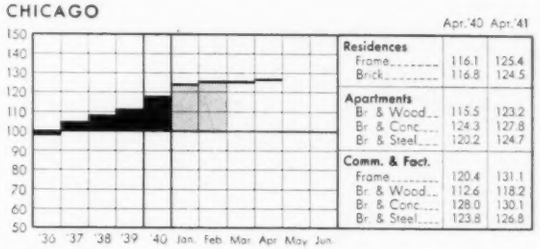
	Apr.'40	Apr.'41
Residences		
Frame	90.1	99.2
Brick	92.4	100.2
Apartments		
Br. & Wood	92.9	100.8
Br. & Conc.	94.7	96.8
Br. & Steel	95.0	98.7
Comm. & Fact.		
Frame	88.8	98.9
Br. & Wood	96.9	101.3
Br. & Conc.	96.4	97.9
Br. & Steel	95.9	98.7

BOSTON



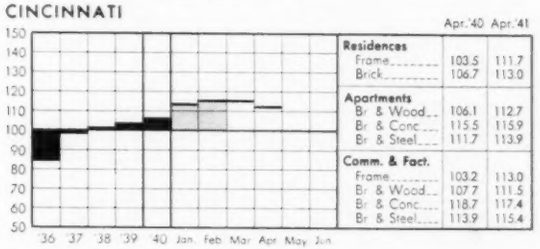
	Apr.'40	Apr.'41
Residences		
Frame	110.6	120.7
Brick	113.8	121.8
Apartments		
Br. & Wood	113.3	121.4
Br. & Conc.	116.6	118.7
Br. & Steel	114.3	118.0
Comm. & Fact.		
Frame	111.0	122.7
Br. & Wood	114.0	119.6
Br. & Conc.	119.0	120.4
Br. & Steel	118.5	121.2

CHICAGO



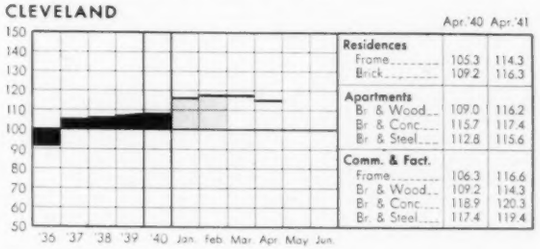
	Apr.'40	Apr.'41
Residences		
Frame	116.1	125.4
Brick	116.8	124.5
Apartments		
Br. & Wood	115.5	123.2
Br. & Conc.	124.3	127.8
Br. & Steel	120.2	124.7
Comm. & Fact.		
Frame	120.4	131.1
Br. & Wood	112.6	118.2
Br. & Conc.	128.0	130.1
Br. & Steel	123.8	126.8

CINCINNATI



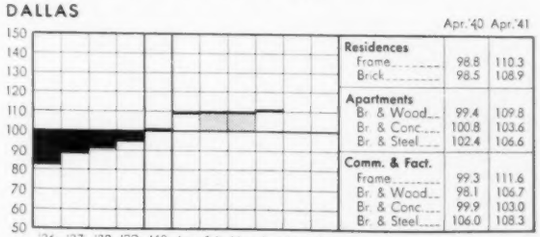
	Apr.'40	Apr.'41
Residences		
Frame	103.5	111.7
Brick	106.7	113.0
Apartments		
Br. & Wood	106.1	112.7
Br. & Conc.	115.5	115.9
Br. & Steel	111.7	113.9
Comm. & Fact.		
Frame	103.2	113.0
Br. & Wood	107.7	111.5
Br. & Conc.	118.7	117.4
Br. & Steel	113.9	115.4

CLEVELAND



	Apr.'40	Apr.'41
Residences		
Frame	105.3	114.3
Brick	109.2	116.3
Apartments		
Br. & Wood	109.0	116.2
Br. & Conc.	115.7	117.4
Br. & Steel	112.8	115.6
Comm. & Fact.		
Frame	106.3	116.6
Br. & Wood	109.2	114.3
Br. & Conc.	118.9	120.3
Br. & Steel	117.4	119.4

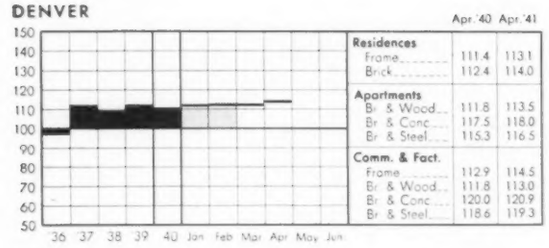
DALLAS



	Apr.'40	Apr.'41
Residences		
Frame	98.8	110.3
Brick	98.5	108.9
Apartments		
Br. & Wood	99.4	109.8
Br. & Conc.	100.8	103.6
Br. & Steel	102.4	106.6
Comm. & Fact.		
Frame	99.3	111.6
Br. & Wood	98.1	106.7
Br. & Conc.	99.9	103.0
Br. & Steel	106.0	108.3

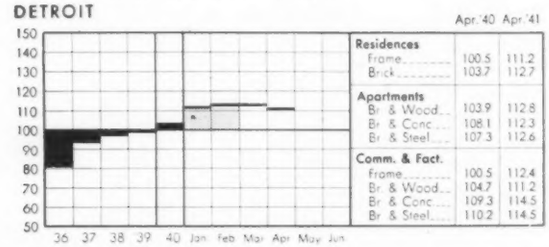
CURRENT TRENDS OF BUILDING COSTS

DENVER



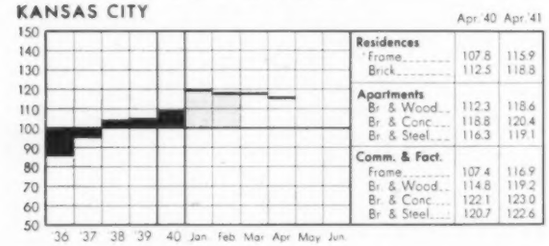
	Apr. '40	Apr. '41
Residences		
Frame	111.4	113.1
Brick	112.4	114.0
Apartments		
Br. & Wood	111.8	113.5
Br. & Conc.	117.5	118.0
Br. & Steel	115.3	116.5
Comm. & Fact.		
Frame	112.9	114.5
Br. & Wood	111.8	113.0
Br. & Conc.	120.0	120.9
Br. & Steel	118.6	119.3

DETROIT



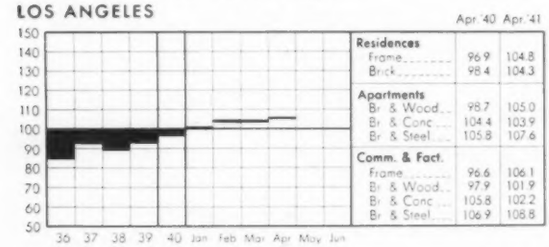
	Apr. '40	Apr. '41
Residences		
Frame	100.5	111.2
Brick	103.7	112.7
Apartments		
Br. & Wood	103.9	112.8
Br. & Conc.	108.1	112.3
Br. & Steel	107.3	112.6
Comm. & Fact.		
Frame	100.5	112.4
Br. & Wood	104.7	111.2
Br. & Conc.	109.3	114.5
Br. & Steel	110.2	114.5

KANSAS CITY



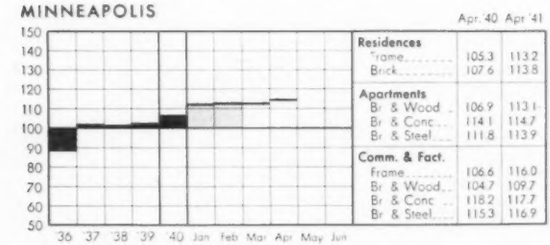
	Apr. '40	Apr. '41
Residences		
Frame	107.8	115.9
Brick	112.5	118.8
Apartments		
Br. & Wood	112.3	118.6
Br. & Conc.	118.8	120.4
Br. & Steel	116.3	119.1
Comm. & Fact.		
Frame	107.4	116.9
Br. & Wood	114.8	119.2
Br. & Conc.	122.1	123.0
Br. & Steel	120.7	122.6

LOS ANGELES



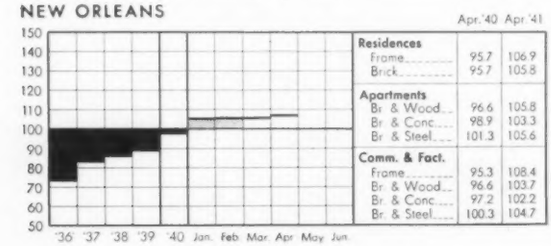
	Apr. '40	Apr. '41
Residences		
Frame	96.9	104.8
Brick	98.4	104.3
Apartments		
Br. & Wood	98.7	105.0
Br. & Conc.	104.4	103.9
Br. & Steel	105.8	107.6
Comm. & Fact.		
Frame	96.6	106.1
Br. & Wood	97.9	101.9
Br. & Conc.	105.8	102.2
Br. & Steel	106.9	108.8

MINNEAPOLIS



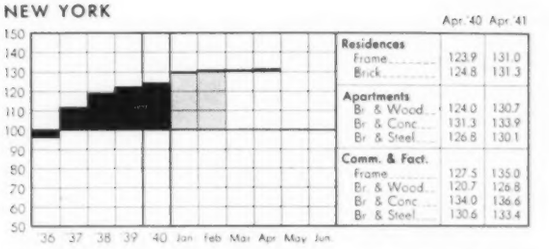
	Apr. '40	Apr. '41
Residences		
Frame	105.3	113.2
Brick	107.6	113.8
Apartments		
Br. & Wood	106.9	113.1
Br. & Conc.	114.1	114.7
Br. & Steel	111.8	113.9
Comm. & Fact.		
Frame	106.6	116.0
Br. & Wood	104.7	109.7
Br. & Conc.	118.2	117.7
Br. & Steel	115.3	116.9

NEW ORLEANS



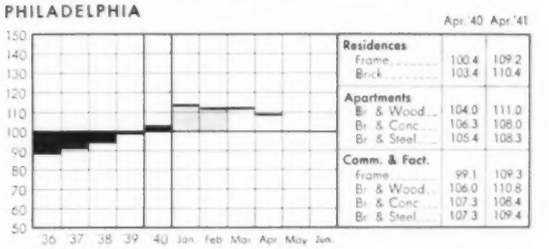
	Apr. '40	Apr. '41
Residences		
Frame	95.7	106.9
Brick	95.7	105.8
Apartments		
Br. & Wood	96.6	105.8
Br. & Conc.	98.9	103.3
Br. & Steel	101.3	105.6
Comm. & Fact.		
Frame	95.3	108.4
Br. & Wood	96.6	103.7
Br. & Conc.	97.2	102.2
Br. & Steel	100.3	104.7

NEW YORK



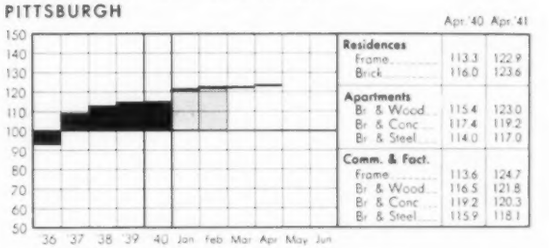
	Apr. '40	Apr. '41
Residences		
Frame	123.9	131.0
Brick	124.8	131.3
Apartments		
Br. & Wood	124.0	130.7
Br. & Conc.	131.3	133.9
Br. & Steel	126.8	130.1
Comm. & Fact.		
Frame	127.5	135.0
Br. & Wood	120.7	126.8
Br. & Conc.	134.0	136.6
Br. & Steel	130.6	133.4

PHILADELPHIA



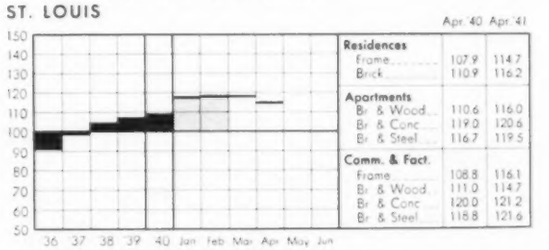
	Apr. '40	Apr. '41
Residences		
Frame	100.4	109.2
Brick	103.4	110.4
Apartments		
Br. & Wood	104.0	111.0
Br. & Conc.	106.3	108.0
Br. & Steel	105.4	108.3
Comm. & Fact.		
Frame	99.1	109.3
Br. & Wood	106.0	110.8
Br. & Conc.	107.3	108.4
Br. & Steel	107.3	109.4

PITTSBURGH



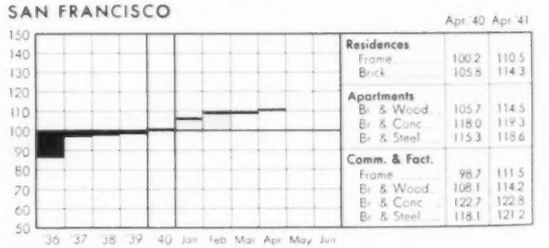
	Apr. '40	Apr. '41
Residences		
Frame	113.3	122.9
Brick	116.0	123.6
Apartments		
Br. & Wood	115.4	123.0
Br. & Conc.	117.4	119.2
Br. & Steel	114.0	117.0
Comm. & Fact.		
Frame	113.6	124.7
Br. & Wood	116.5	121.8
Br. & Conc.	119.2	120.3
Br. & Steel	115.9	118.1

ST. LOUIS



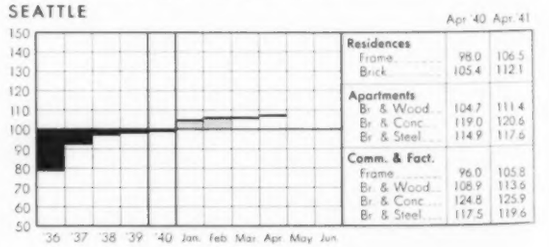
	Apr. '40	Apr. '41
Residences		
Frame	107.9	114.7
Brick	110.9	116.2
Apartments		
Br. & Wood	110.6	116.0
Br. & Conc.	119.0	120.6
Br. & Steel	116.7	119.5
Comm. & Fact.		
Frame	108.8	116.1
Br. & Wood	111.0	114.7
Br. & Conc.	120.0	121.2
Br. & Steel	118.8	121.6

SAN FRANCISCO



	Apr. '40	Apr. '41
Residences		
Frame	100.2	110.5
Brick	105.8	114.3
Apartments		
Br. & Wood	105.7	114.5
Br. & Conc.	118.0	119.3
Br. & Steel	115.3	118.6
Comm. & Fact.		
Frame	98.7	111.5
Br. & Wood	108.1	114.2
Br. & Conc.	122.7	122.8
Br. & Steel	118.1	121.2

SEATTLE



	Apr. '40	Apr. '41
Residences		
Frame	98.0	106.5
Brick	105.4	112.1
Apartments		
Br. & Wood	104.7	111.4
Br. & Conc.	119.0	120.6
Br. & Steel	114.9	117.6
Comm. & Fact.		
Frame	96.0	105.8
Br. & Wood	108.9	113.6
Br. & Conc.	124.8	125.9
Br. & Steel	117.5	119.6

How often do you ask yourself:

"WHAT WILL THIS HOUSE BE LIKE 20 YEARS FROM NOW?"

You will find a house Dri-Bilt with Douglas Fir Plywood more durable, more rigid, more comfort giving than the same house built conventionally!

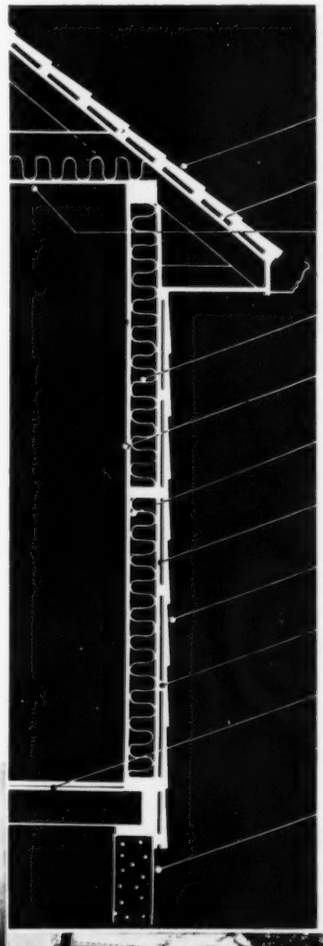
Dri-Bilt with Douglas Fir Plywood houses are superior houses that will still be sound when their mortgages are paid off. Their walls are nearly 6 times as rigid as walls with horizontal board sheathing. Their interior walls are mar-proof and crack-proof, yet receptive to any finish. Dri-Bilt houses are warmer, dust-proof, wind-proof. They sell easily because they can be financed through F.H.A. They are approved by the Uniform Building Code.

What Dri-Bilt with Plywood means

Dri-Bilt with Douglas Fir Plywood means better, faster, more durable building construction through the use of this "modern miracle in wood." It means using the proper grades of these big, strong, lightweight panels for concrete forms, sub-flooring, wall and roof sheathing, interior walls and ceilings, built-ins and exterior finish.

The result is a substantial saving in time and labor, and a better house for the same money. Many builders are reducing building time as much as 6 weeks by using the standard Dri-Bilt method, because handling, fitting, cutting and nailing are minimized . . . because there is no waiting for plaster to dry. The DFP Dri-Bilt method enables multiple-unit builders to have standard 4 and 5 room houses ready for occupancy 2 weeks after starting.

Consult Sweet's Catalog or write for free Dri-Bilt Manual; Sweet's Reprint; U. S. Commercial Standard CS45-40; new Finishing Folder. Douglas Fir Plywood Assn., 1500 Tacoma Bldg., Tacoma, Wn.



GLUED PLYWOOD HOUSES RESIST TORNADO!

A 200-mile-an-hour tornado swept through Evansville, Ind., last summer. In the storm's center were 2 rows of new houses built under F.H.A. specifications by Modern Builders, Inc., nationally known contractors. Among them were some Dri-Bilt with Plywood or all-plywood homes, whose construction differed from standard Dri-Bilt construction only in that panels were glued to studding instead of being nailed.

These plywood houses were the only ones the insurance adjustors did not write off as total losses. The cost of rehabilitating the plywood houses was only 10% of their value. $5 went for repairing damage to shingles; the rest for replacing glass, cleaning out dirt and scrubbing the interior. In the other houses the plaster was knocked off the walls. The plywood interior walls and ceilings needed only washing.

The principal damage to the conventionally built houses was due to their having been blown off their foundations. In the opinion of experts, "the plywood house could have been blown off its foundation with very little damage, due to its extreme rigidity. And had it blown off, it would have remained square and could have been rehabilitated at small expense."

Large homes can also be Dri-Bilt to very good advantage. The interior walls of this handsome Portland, Ore., home are forever mar and crack-proof.

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SPLIT-PROOF
STRONGER

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GENUINE PLYWALL Douglas Fir Plywood WALLBOARD D.F.P.A. INSPECTED

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PLYPANEL D.F.P.A.

EXT.-D.F.P.A.

GENUINE PLYSCORD SHEATHING D.F.P.A.

THE ARCHITECT'S RIGHT TO PAYMENT . . . Part I

By NATHAN YOUNG

NO LEGAL PROBLEM affects the Architect so vitally as his right to payment for services rendered. The determination of this right favorably to the Architect depends not upon what he does when the problem arises but upon his intelligent alertness in anticipating the difficulty.

For example, where an Architect undertakes to prepare plans and specifications for a building to cost not more than a stipulated sum, the design of a structure substantially exceeding this maximum will produce no reward either for masterful artistry or enthusiastic toil. Therefore the Architect should, wherever practicable, avoid any guarantee as to precise cost. If, however, a guarantee has been exacted, the Architect must plan the work within the limit.

Cases cited

In Feltham v. Sharp, a Georgia case, it was held that an Architect is not entitled to his fee unless the building can be erected at a cost "reasonably approximating that stated in such estimate."

In the New York case of Gardner v. Potter it was held that where an Architect undertook to plan a building to cost not more than $15,000 approximately, he had satisfactorily performed his contract by designing a structure costing $16,000.

An interesting case on this subject involving facts of a somewhat unusual character is that of Clark v. Smith, recently decided.

It appears that the owner exhibited to the Architects a picture of a house of Georgian design and asked the latter to draw plans and specifications for a similar building. The cost was not mentioned by either.

Upon completion of the plans and specifications and approval by the owner, bids were requested and received. They totaled $18,393. This was higher than the owner had anticipated. So he asked the Architects for certain revisions. The revised plans and specifications produced bids totaling $17,925.

Thereupon the owner for the first time stated that the maximum he desired to spend was $12,000. He requested the Architects to further revise the plans and specifications, retaining the style originally planned, so as to bring the cost down to that figure. This, said the Architects, was impossible.

The court upholding the Architects' right to payment in full stated, "We find no merit in the contention that it was the duty of the defendants (Architects) to inquire at the outset the amount of money plaintiff (owner) was willing to spend . . ."

The court further held that the Architect was entitled to payment regardless of the fact that it would be necessary for the owner to obtain and pay for an entirely new set of plans and specifications.

Now suppose that the Architect exceeds the money limit set by the owner. Has he any right to compensation? Yes, if within a reasonable time he amends the plans and specifications to reduce the cost to its proper level. Otherwise the Architect forfeits his right to payment. This, of course, means that where the plans and specifications as originally drawn call for a building too costly in price, the owner must give the Architect a reasonable time to make the necessary changes, and that the Architect must act in this regard with reasonable promptness.

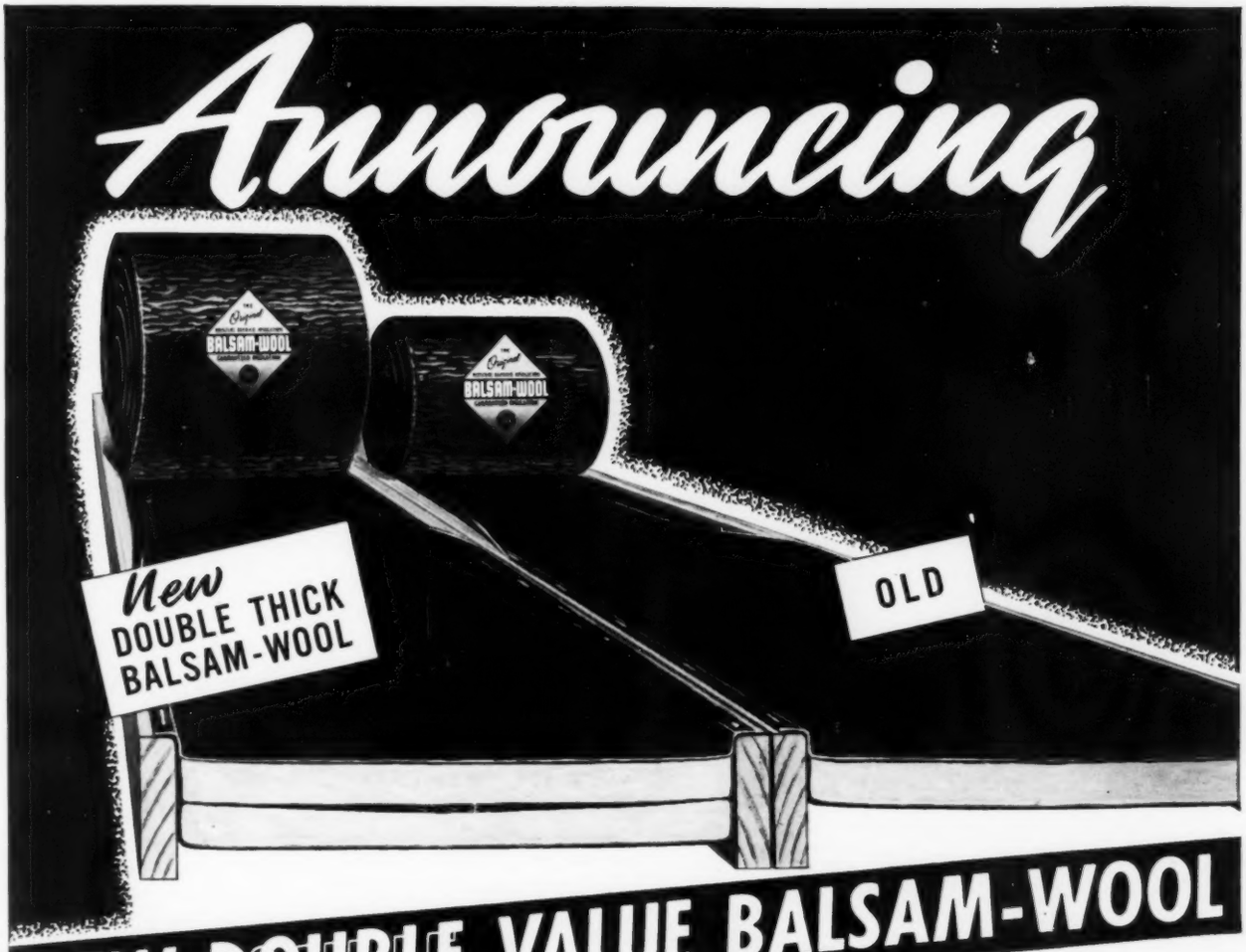
In the leading Iowa case of Marquis v. Loretson it appears that the Architect, although instructed to design a building to cost $10,000, drew plans and specifications for a structure that would cost $16,000. The owner rejected the design. Thereupon the Architect altered the plans to reduce the cost to the stipulated $10,000. The court held that the Architect was entitled to payment in full for his services.

Another possible pitfall for the Architect to avoid is an agreement on his part to furnish plans and specifications to be paid for only on the happening of a certain event. Such agreement thoughtlessly assented to by the Architect often results in a denial of payment to him. For example, if payment is conditioned upon the acquisition of title to a certain parcel of land by the owner, and the owner should fail to acquire such title, he need not pay the Architect. Or if the Architect agrees to furnish plans and specifications to the satisfaction of the owner, failure to satisfy the owner's taste is fatal to the Architect's right to payment.

However, if it clearly appears that the owner is not acting in good faith, the Architect may establish his right to payment.

Cloak for fraud

This may be illustrated by the following hypothetical case. Assume that an owner enters into a binding agreement wherein he commissions Architect "A" to draw plans and specifications for a certain building. Assume further that at the same time the owner requests Architect "B" to draw plans and specifications to be paid for only in the event that such plans and specifications satisfy the owner. Assume further that Architects "A" and "B" draw the necessary plans and specifications, and the owner, claiming that he is dissatisfied with "B's" design, rejects it and proceeds with the building operation using "A's" plans and specifications. It is evident here, from the owner's unconditional agreement with "A," that he never had any intention of using "B's" design. In such case "B" may recover for his services.



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DOUBLE AIR SPACES—to increase insulation efficiency—to allow walls to breathe.

DOUBLE BONDING — Balsam-Wool is doubly bonded to inside of liners to prevent settling or packing down.

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REVIEWS OF CURRENT LITERATURE

Compiled by ELISABETH COIT, AIA

ERIC MENDELSOHN. By Arnold Whittick. London, Faber and Faber, 1940. 182 pp., 6¼ by 11 in., illus. (drawings, photos). $7.50

WITH some 75 usefully captioned halftones, and over a hundred of Mendelsohn's crisp drawings carry-their creator's inimitable legends, this work is packed with significant factual and appreciative information on one who may come to be regarded as the "representative architect of the age."

An introductory chapter presents in unhackneyed language an outline progress of architecture during the three centuries preceding 1914; and the final chapter records the author's estimate of the esthetic value and significance of Mendelsohn's work. Between these there are just enough details of his personal life to show how his happy musical childhood's home combined with his town and countryside to show him beauty, and how the castle and nearby church probably worked together to inspire those piled up effects in the soaring drawings labelled "Bach Toccata," "Agnus Dei," "Brahms Quintet," "Ninth Symphony." Mr. Whittick records his exchange of letters with the musician he early married about ideas now recognized as fundamental in his work—though halftone pictures of their home demonstrate that while soaring effects are beautiful, life is lived on quiet horizontal planes.

From the exhilarating drawings made in the trenches during 1914-1918 onwards, all letters, projects, achievements, and other movements are dated; so that, inversely, the record of an artist's thought and work in today's modern idiom in Germany, in Palestine, in America and in England is the story of one able, eager, happy and successful individual's architectural achievement.

A beautiful book this is, too, one of a type which for the moment is no longer produced by a country under war stress. It is one to read for the joy that comes from the highest order of pleasure.

LOS ANGELES: PREFACE TO A MASTER PLAN. Edited by George W. Robbins and L. Deming Tilton. Los Angeles, Ward Ritchie Press for the Pacific Southwest Academy, 1941. xvi plus 304 pp., 6 by 9¼ in., illus. (charts, maps, tables, plans, photos). $3.00, cloth; $2.00, paper

UNUSUAL are the planning problems of Los Angeles with its many neighbor towns, its combination of hills, mountains, rivers and coast line, its special industries, its attraction for people. With a grant from the Haynes Foundation, the Pacific Southwest Academy has collected from leading authorities on aspects of civic life a score of special studies to form No. 19 in the factual studies of modern social complications comprising its series of "Publications."

These, under the editorship of a State Planning Board officer and a university Professor of Marketing, are presented in attention-compelling form such that the reader not especially interested in the master plan will vote this a good introduction to modern economic geography, while architect and planner will welcome practical illustrated studies of homes and housing, transit and transport, recreation, business, civic and other aspects.

HOW TO BUY OR BUILD YOUR HOME WISELY. By Roland Knight Abercrombie. New York, Macmillan, 1941. 156 pp., 5 by 7½ in., illus., tables. $1.75

SAVINGS AND LOAN CONSTRUCTION STANDARDS. . . . By the Editors of the American Savings and Loan News. Benjamin F. Betts, Consulting Editor. Cincinnati, A. S. and L. News, 1941. 177 pp., 5¼ by 8½ in., illus.

MR. ABERCROMBIE writes a vivid short book on costs and values, on buying a home, and on building and protecting a home, including a comfortable amount of the information the layman needs on financing, on estimating the economic value and the costs of ownership, choosing a location and a site. Only the architect familiar with every detail of house estimating and with conditions in all potentially important localities can quite afford not to read the chapter called "Estimating Construction Costs."

"Construction Standards" shows a decade's follow-up of an exploratory and experimental edition of a book with the same title published in 1930. The authors' aim is to meet the present needs of all concerned with the home building industry in a day when competition is making for a better product at a lower price.

ARCHITECTURE IN OLD CHICAGO. By Thomas Eddy Tallmadge. Chicago, University of Chicago Press, 1941. 218 pp., 6 by 9⅛ in., illus. $3.00

AT THE TIME of his sudden death last year the author of "Architecture in America" and "The Story of England's Architecture" left part of a history of his city in terms of architecture "from the palisades of a military post in the wilderness to the soaring towers of the present." His story had been brought down to the Columbian Exposition of 1893; and this volume presents substantially the manuscript left by Mr. Tallmadge with the addition of such illustrations as a committee of his friends felt would have been the author's choice.

WHITE PILLARS: EARLY LIFE AND ARCHITECTURE OF THE LOWER MISSISSIPPI VALLEY COUNTRY. By J. Frazer Smith, A.I.A. New York, Helburn, 1941. 252 pp., 8½ by 11 in., illus. (drawings, plans, by the author). $6.00

WHITE PILLARS is the result of an architect's 10 years' study of the life and architecture of the South west of the Alleghenies, from the time of the Revolution to the War between the States, as evidenced in over 60 homes.

Primarily a layman's book, the work has value also for the architect on many counts. Its drawings are architecturally descriptive as ordinarily only an architect's drawings can be; in many cases there are accompanying plans; and modestly tucked away is a useful section, "For Those Who Would Delve Further...."

(Continued on page 32)

MAHON Rolling Steel DOORS

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Protection is a vital factor in defense plant construction—protection against FIRE, against MARAUDERS, and against all conditions of WEATHER. Recognition of this fact is evidenced in the tremendously increased demand for Mahon Rolling Steel Doors. For the steel slat construction of Mahon Doors provides protection at many of a building's most vulnerable points—at receiving and shipping docks—at openings in partition walls—in elevator shafts, etc.

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MAHON

REVIEWS OF CURRENT LITERATURE

(Continued from page 30)

MEN AND VOLTS. By John Winthrop Hammond. Philadelphia, Lippincott, 1941. 436 pp., 6 by 9¼ in., illus. $2.50

AS ONE OF the important pioneers in electric light and power, the General Electric Company parallels in its history the development of the "Machine Age"—indeed, in many important instances, has been instrumental in furthering its expansion. This book chronicles the story of the first two of the three score years during which electricity has been developed for human use. The author, at the time of his death in 1934, had brought his record to 1922, and to Arthur Pound's editing of the manuscript General Electric has added a brief epilogue to highlight the major achievements of succeeding years.

BYERS WROUGHT IRON FOR RADIANT HEATING INSTALLATIONS. Pittsburgh, A. M. Byers Co., 1941. 44 pp., 8½ by 11 in., illustrated

A REVISION of a former book, this study gives a picture of the radiant heating field—its importance, highlights of technical design, piping, examples of installations in various types of buildings. Essentially a promotion piece for the Byers Company, it has a wide general application. A useful bibliography is included.

HEATING, VENTILATING AND AIR CONDITIONING GUIDE. Vol. 19. New York, American Society of Heating and Ventilating Engineers, 1941. xxiii plus 1120 plus 96 pp., 6 by 9 in., illus. (charts, diagrams, graphs, tables). $5.00. With thumb index, $5.50

FOR this nineteenth edition nearly half of the chapters have been reviewed and rewritten; and some rearrangement and grouping of the 46 chapters into seven sections gives an added sense of order and proportion.

There is a new detailed chapter on Thermodynamics of Air and Water Mixtures; and a new working chart, the Mollier Diagram for Moist Air.

CURRENT PERIODICAL LITERATURE

Precast Concrete for Bomb Shelters in Quick Time. By A. O. Aisher. Concrete (Cement Mill Edition), Chicago, April, 1941

Air Raid Damage. . . . By Sydney E. Castle, F.R.I.B.A. Illustrated Carpenter and Builder, London, Feb. 28, 1941, pp. 230-1

UNDERGROUND, or partly underground, one has the best protection from bomb explosions. These two complementary articles describe construction of one-family and larger shelters.

At first shelter trenches were lined with wood; but there is not enough wood in the country to do the job properly. Now reinforced concrete, either in precast units or poured in place, forms the floor and walls up to ground level. The Home Office standard requires resistance to be 400 lbs. a sq. ft. Above the ground level angle-iron steel and corrugated galvanized iron sheathing are used and the whole construction covered with soil at least 18 in. deep.

A blast wall obstructs the entrance to prevent or minimize damage or destruction from explosions near the entrance, and an emergency exit is provided.

(Continued on page 34)

IT'S BIG NEWS...
to the Building Industry

★ STEEL SASH "MERIT-METER" ★

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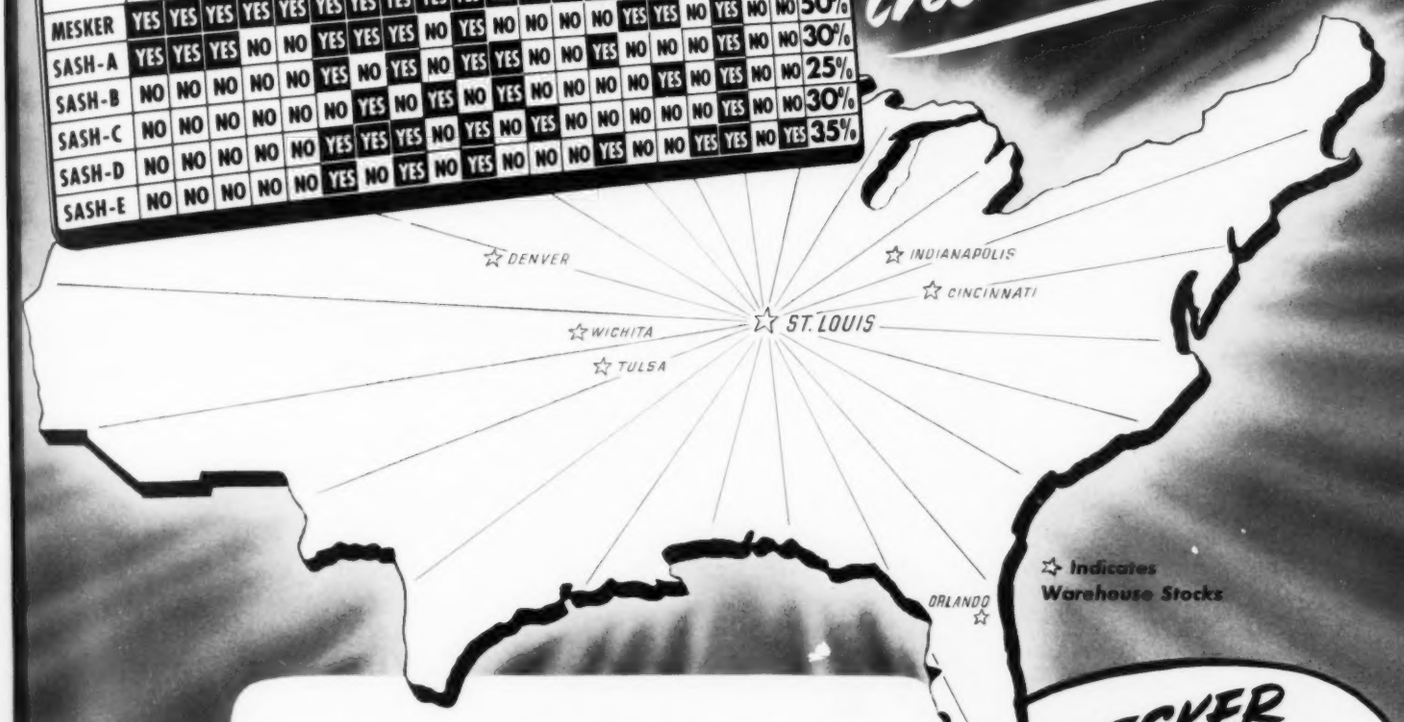
MESKER	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	NO	85%	
SASH-A	YES	YES	YES	NO	NO	YES	YES	YES	NO	YES	NO	NO	NO	YES	YES	NO	YES	NO	NO	50%	
SASH-B	YES	YES	YES	NO	NO	YES	NO	YES	NO	YES	YES	NO	NO	YES	NO	NO	NO	YES	NO	NO	30%
SASH-C	NO	NO	NO	NO	NO	YES	NO	YES	NO	YES	NO	YES	NO	NO	NO	YES	NO	NO	YES	NO	25%
SASH-D	NO	NO	NO	NO	NO	NO	YES	YES	YES	NO	YES	NO	YES	NO	NO	NO	NO	YES	NO	NO	30%
SASH-E	NO	NO	NO	NO	NO	YES	NO	YES	NO	YES	NO	NO	NO	YES	NO	NO	YES	YES	NO	YES	35%

clear across the country!



Architects, builders, dealers... the whole building industry is talking about the Steel Sash Merit-Meter. It's the one simple, easy-to-understand comparison of steel window quality. Based on sworn facts, taken largely from Sweet's 1940 Architectural Catalog File, it compares the quality of leading steel windows, point-by-point, FACT BY FACT. It PROVES Mesker gives you at least 35% more quality for your money! While detailing only Industrial Pivoted Sash features, it's indicative of the extra value in *all* Mesker products. *It's the one SURE WAY to specify steel sash the RIGHT WAY.* Get *your* copy now!

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5-AR-51 ☆

REVIEWS OF CURRENT LITERATURE

(Continued from page 32)

A major problem is drainage. Excavating four feet gives plenty of soil for protection but in clay that gives too much water, and many variations in geological water conditions are sometimes not easily foreseen. Curbs raised as high as the back escape door permits, and a 4-2½-1 concrete lined with waterproof cement seem to be the best solution.

Air Raid Damage. . . . By Sydney E. Castle, F.R.I.B.A. Illustrated Carpenter and Builder, London, Mar. 7, 1941, pp. 262-3

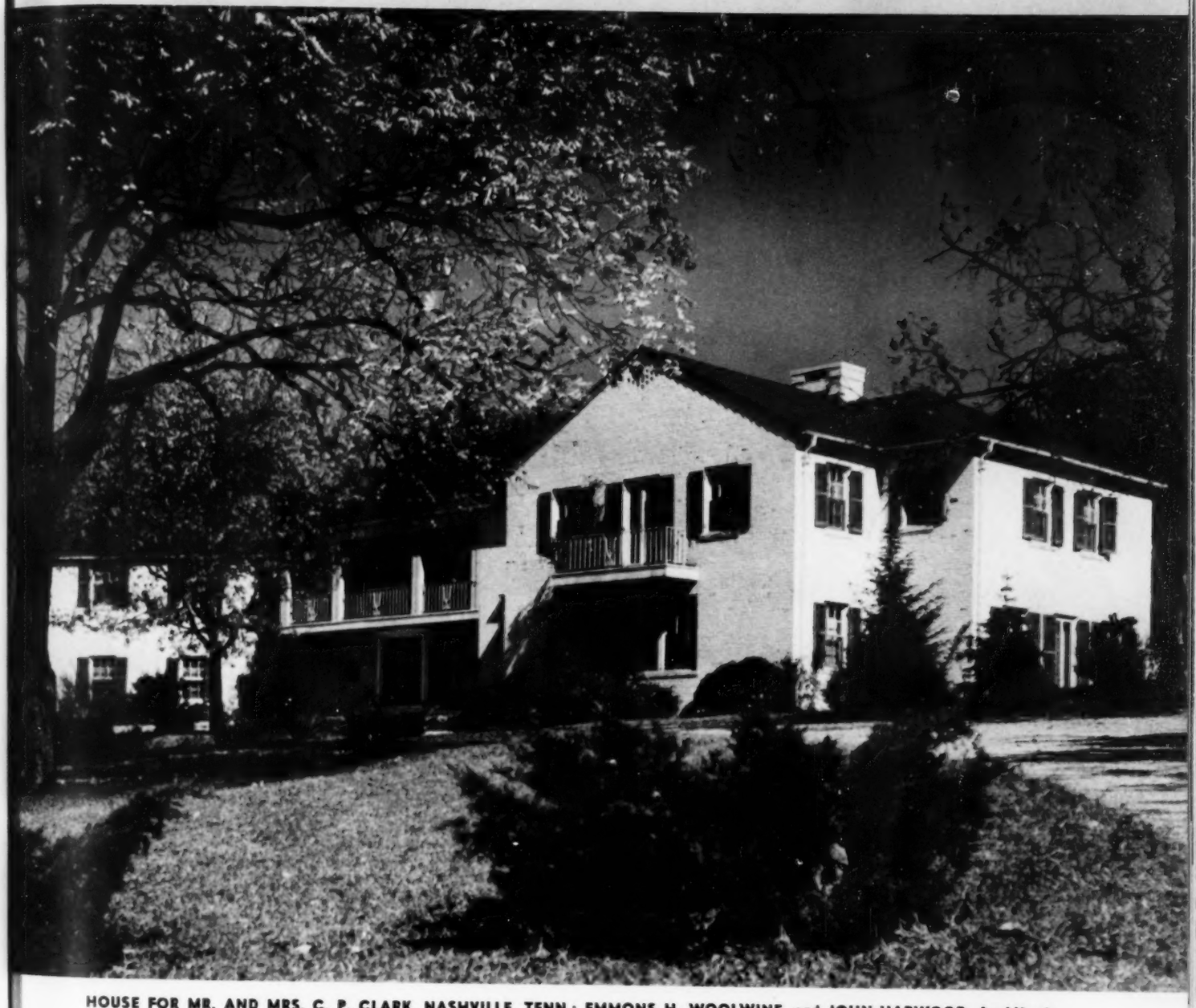
APPARENTLY no conclusions regarding buildings' resistance to blasting are possible except that good construction as a rule stands better than that "composed of sticks and nails." Nevertheless, Norman walls within the Tower of London which have stood well during nine centuries have been in recent raids "rooted up like a carrot." In this, the third of a series, are given some astonishing examples of the effects of high-power blasting on constructions of various types: One bomb made a crater so deep that it was a small mountaineering feat to climb down into it, but disturbed none of the immediate back elevations of row houses below the chimney pots, and even that half-heartedly; a key-hole escutcheon plate was found a block away from the otherwise unscathed door to which it belonged; roof tiles have held so solidly that the roof could have been hoisted back if the house had survived; and a detached house of brick bonding shot back from one to four inches at the level of the damp course, with no damage beyond a few interior cracks and a cracked pane or two in the leaded glass windows.

Heat Gained Through Windows With and Without Shadings. Sheet Metal Worker, Feb., 1941, pp. 42, 44

THIS REPORT, condensed from the paper presented by F. C. Houghton and David Shore to the 1941 ASHVE Conference at Kansas City, describes 13 arrangements of shadings to determine the effectiveness in keeping out radiant heat from sun's rays of devices including awnings, venetian blinds, roller shades and absorbing glass.

The Water Wheel Returns. By Walt Johnson. Arts and Decoration, New York and Stroudsburg, Pa., April, 1941, p. 15, photos

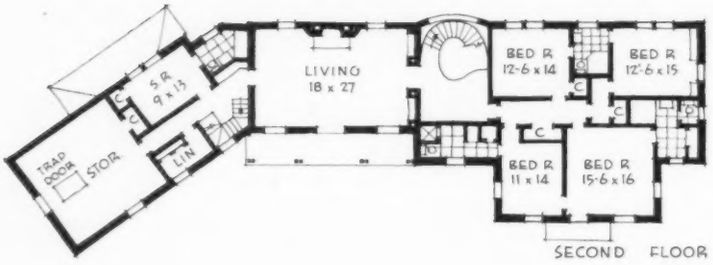
THE "OLD MILL" featured in advertisements for country real estate may have an aged look, but where there is a change of level and some water it is often an efficient power machine. In Pennsylvania alone, almost two thousand water wheels are doing a good turn, starting a turbine unit on the way to providing electric lighting for the home, water for the livestock and power for spraying trees.

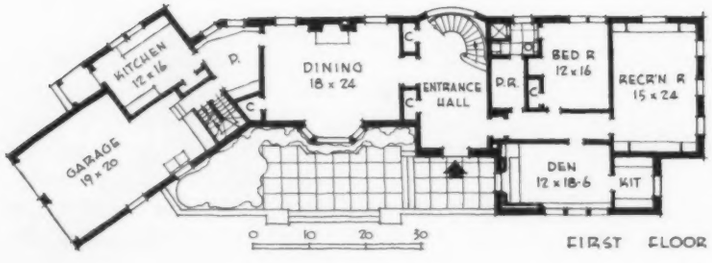


HOUSE FOR MR. AND MRS. C. P. CLARK, NASHVILLE, TENN.: EMMONS H. WOOLWINE and JOHN HARWOOD, Architects

HOUSES

This month's group of houses, selected from widely separated regions of this country, vary in size (one to six bedrooms), style, and solution. The basic planning ideas have widespread potential application and adaptability to the fundamental problems of residential planning in any part of the country. As is pointed out many elements conform to the standards mentioned in "How Safe Is The House?" (p. 67).

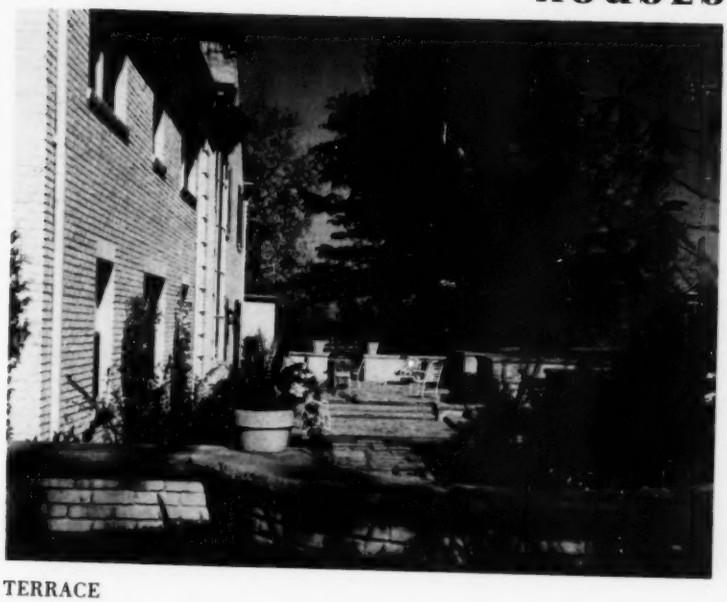




EMMONS H. WOOLWINE and JOHN HARWOOD, Architects

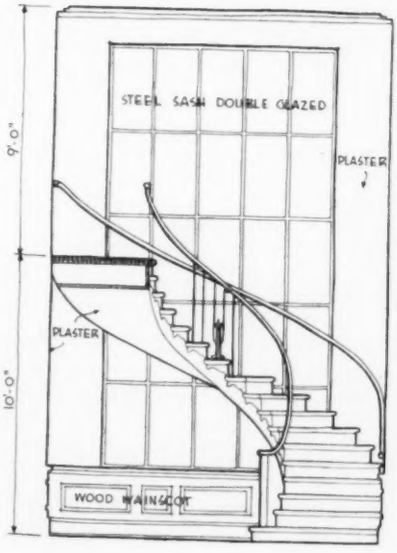
REQUIRED FOR THE NASHVILLE, TENN. residence of Mr. and Mrs. C. P. Clark was a ground floor suite for entertaining which would be independent of the main living and service areas. Hence the den, recreation room and kitchenette. The living room was placed on the second floor to take advantage of a fine view over the surrounding countryside. This location also simplified the framing. The room opens on a balcony, cantilevered from living room floor and additionally supported by tie rods from roof rafters. Since the owner preferred a storage room to attic space, such a room was provided over the garage. This arrangement has the additional advantage that by means of block and tackle immediately above a trap door lifting of heavy objects is facilitated.

Photos by St. Thomas



TERRACE

DINING ROOM



STAIR HALL

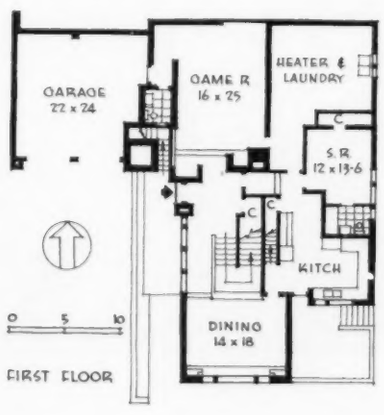
ALDEN B. Dow, Architect

THE PLAN OF THIS MIDLAND, MICH. house was conditioned by the sloping lot, and by the view obtainable from second floor level. Thus living room and study on the second floor have the best outlook; rooms used either less frequently or for shorter periods of time are on the ground floor. Exterior walls are of light pink brick and turquoise blue building board, with varnished wood trim. Interior walls are of natural white plaster or brick; carpets are brilliant blue-green in color. Provision for light—both artificial and natural—is ample: note large glass areas (admitting plenty of daylight) and flush ceiling lights to complement the natural source. Circulation is provided for with little waste space; service stairs are located immediately behind the main stair, and are partitioned off for privacy. The plenitude of closets, cupboards and shelves provides for storage of all types, and is itself an excellent safety measure.

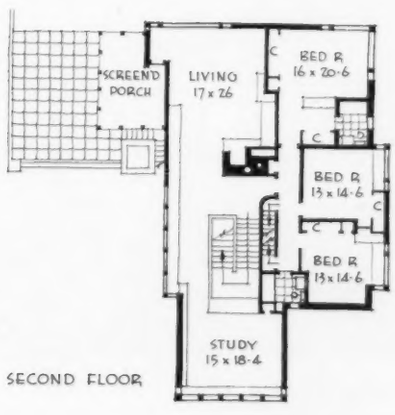
HOUSES

Photos by Elmer L. Astleford

Interiors overpage →



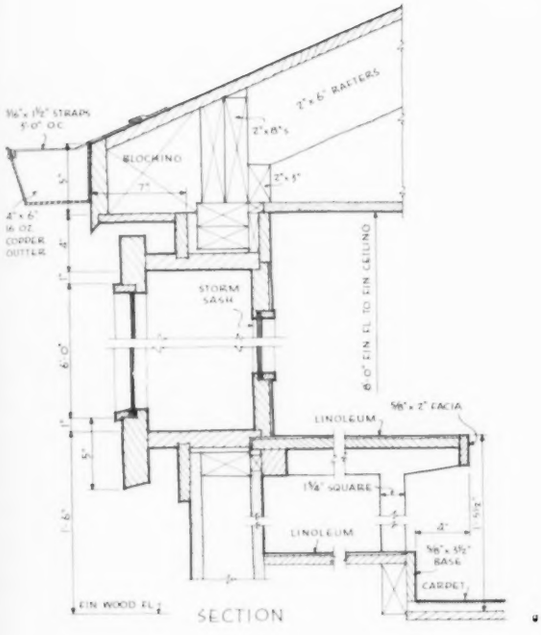
FIRST FLOOR



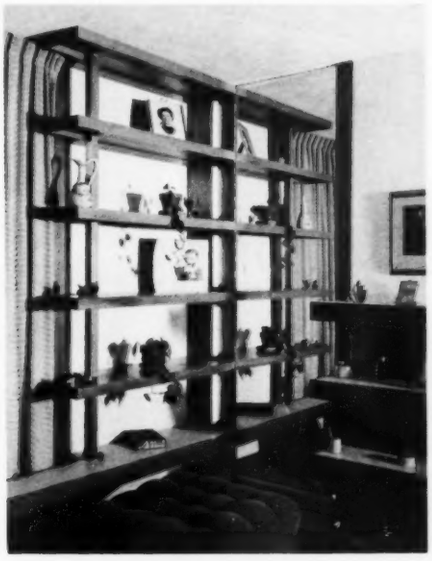
SECOND FLOOR

ENTRANCE HALL from stair landing

LIVING ROOM: View toward stair hall

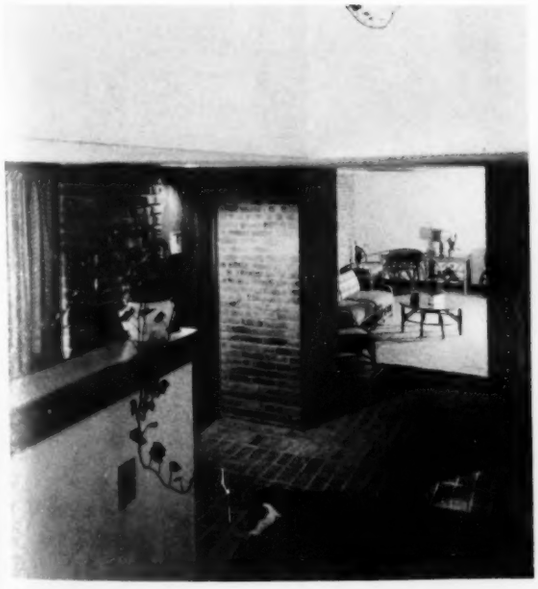


DETAIL OF WINDOWS in study, hall and bedrooms



DRESSING TABLE and shelves in bedroom

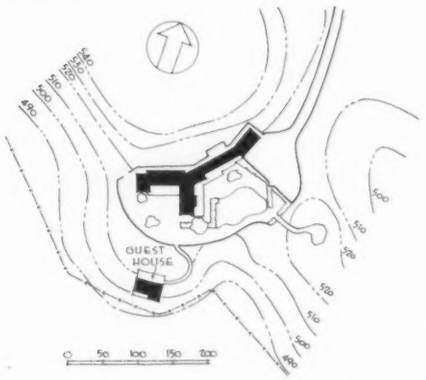
DINING ROOM



ENTRANCE HALL looking toward recreation room

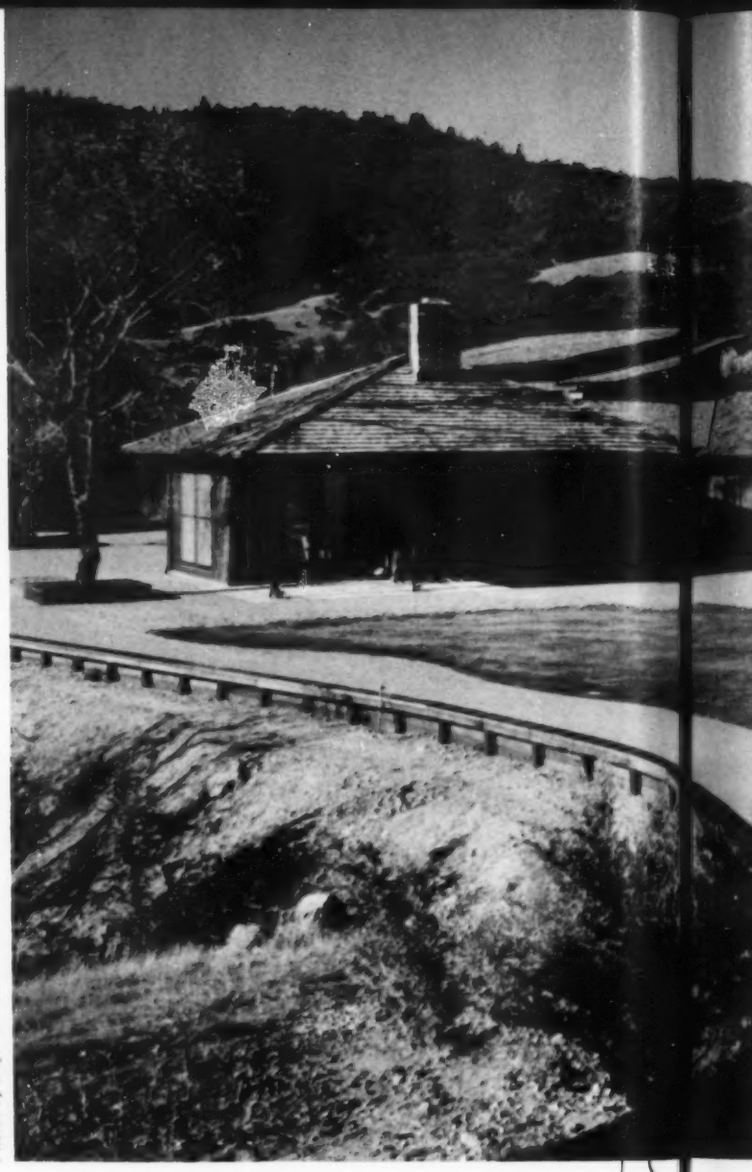
STAIR HALL

HOUSES

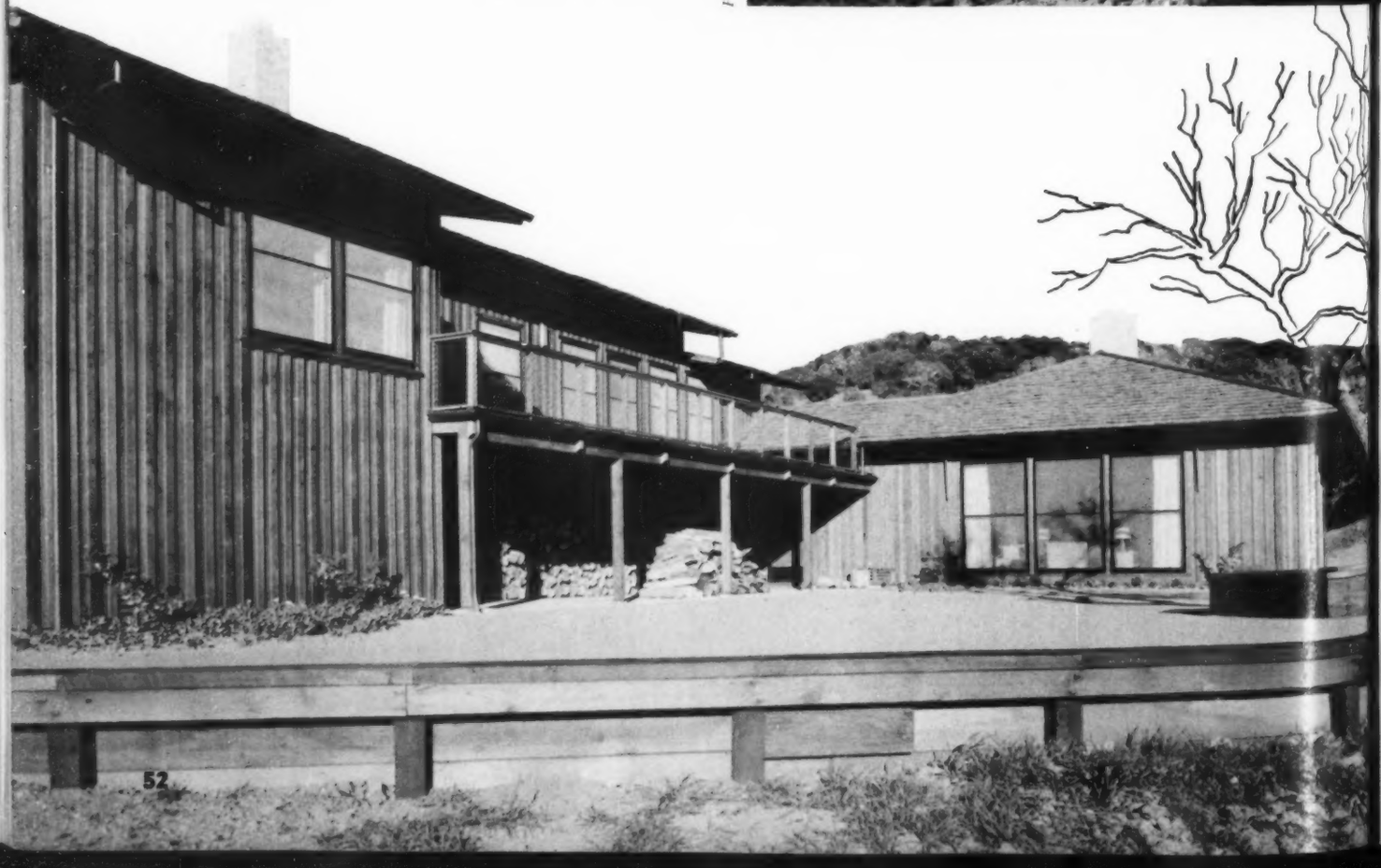


WILLIAM WILSON WURSTER, Architect

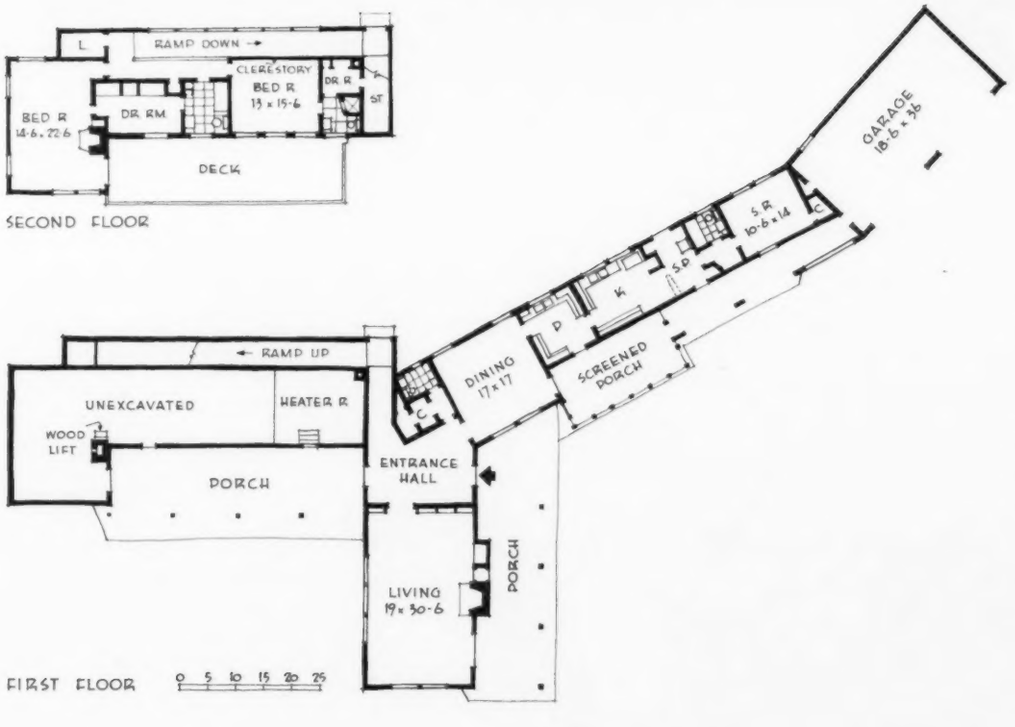
AN UNUSUAL FEATURE OF THIS HOUSE NEAR GILROY, CALIF. for Mrs. A. G. Reynolds, is the use of ramps throughout instead of stairs. This device, long considered a safety measure, is practical in this instance since the spread-out plan accommodates the ramp without materially increasing the amount of walking necessary. Nowhere in the house or garden area are steps used for a change of level; terraces are flush with floor level. Pitch of the hipped roof is steeper than that of the shed over the rest of the house: the effect is that both slopes appear to be the same. Exterior siding is redwood boards and battens, with two coats of boiled linseed oil. Interior finish is Ponderosa pine; ceilings are of wall board.



Photos by Roger Sturtevant

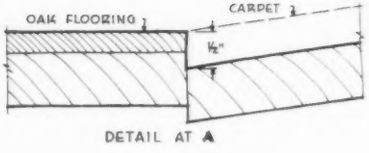


Interiors overpage →

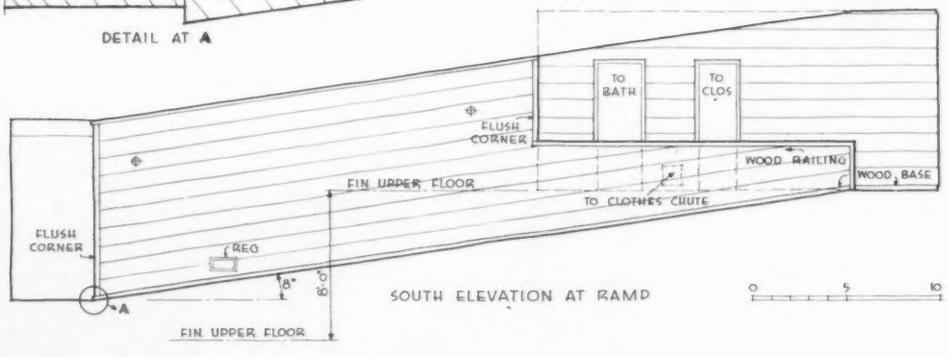


LIVING ROOM

RAMP from living area to sleeping quarters

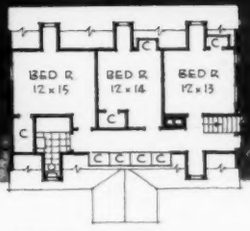


DETAIL AT A

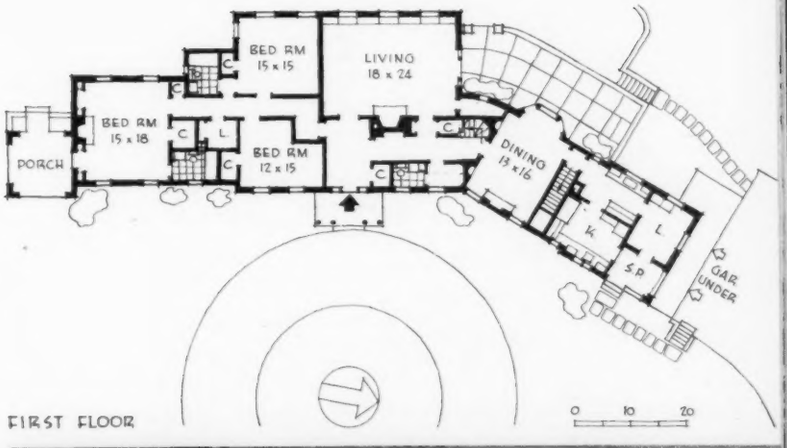


SOUTH ELEVATION AT RAMP

HOUSES



SECOND FLOOR

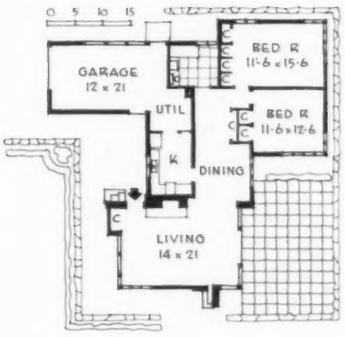


FIRST FLOOR

FRANKLIN and BROWN, Architects

ON A KNOLL IN SEWICKLEY, PA. is the residence for Mrs. Margaret A. Campbell. The long, rather rambling plan recognizes the terrain, and makes possible location of bedrooms on the first floor, so that the house is essentially a one floor residence. The service area is located near the entrance road, convenient for deliveries. The laundry, on the same level with, and accessible from kitchen as well as from the service porch, involves no extra walking or climbing of stairs. Ample storage space is provided. A light standard at the entrance to the driveway reduces possibility of night accidents. Driveway markers are painted white for greater visibility.

HOUSES



FRASIER SMITH, Designer

NEAR WHEELING, W. VA. is the residence of Mr. and Mrs. Frasier Smith. The plan is so compact that an absolute minimum of hall space is necessary, but circulation is ingeniously provided for. The dining alcove is the means of access between living and sleeping areas; since its use is confined to specific times when circulation is unnecessary, use of the space for these two functions is logical. For so small a house there is an unusual amount of storage space. Another feature is the combination of kitchen, utility room and garage; these form one unit and have worked out satisfactorily, according to Mr. Smith. The house was planned for minimum upkeep and maintenance, and, except for the solid black floors which show dirt easily, has justified the owner's hopes. The exterior is of redwood siding, unfinished, with deep blue trim; interiors are finished in plywood, except for the kitchen and bath, where walls are of painted wall board. Ceilings throughout are of fibre board.

ENTRANCE DETAIL

LIVING ROOM looking toward dining alcove

DINING ALCOVE and hall

KITCHEN: note lighting of work space

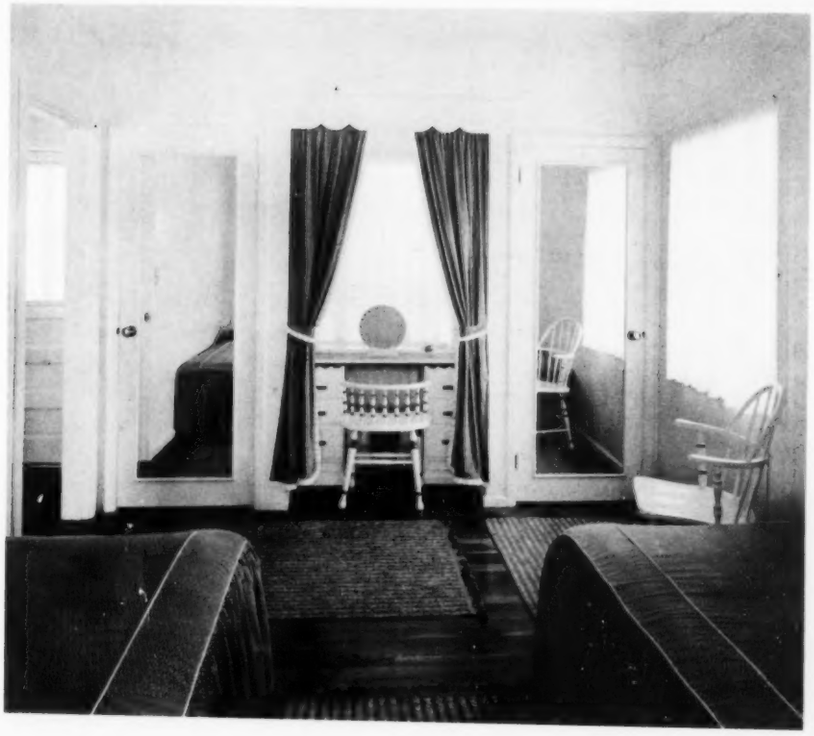
Photos by R. Luttrell; Gottscho

HOUSES

DINING ALCOVE

L. R. PATTERSON, Architect

THIS SMALL HOUSE IN MIAMI, FLA. was designed by the architect as a winter home for himself and his wife. The organization of the plan is direct and compact; plenty of storage space is provided, and there is a minimum of hall area, but circulation is unhampered. Dining area is separated from the living room only by a movable screen. The exterior is of "adobe" cement brick; interior finish is western white pine, painted. The roof is of white cement shingle tile, a much used local material. The house is equipped with a solar water heater.

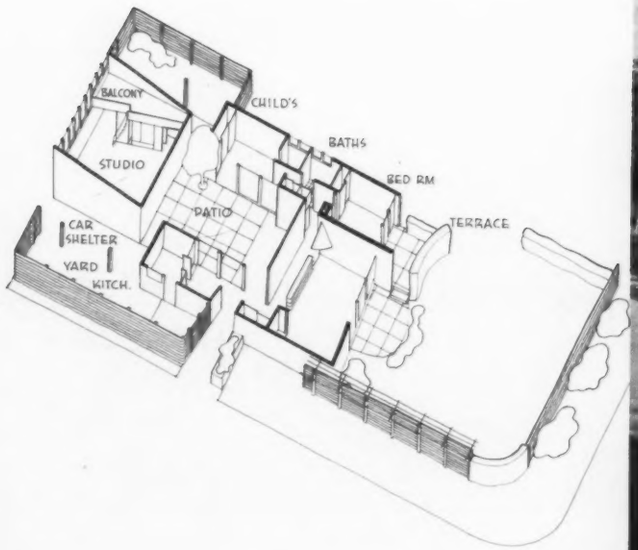


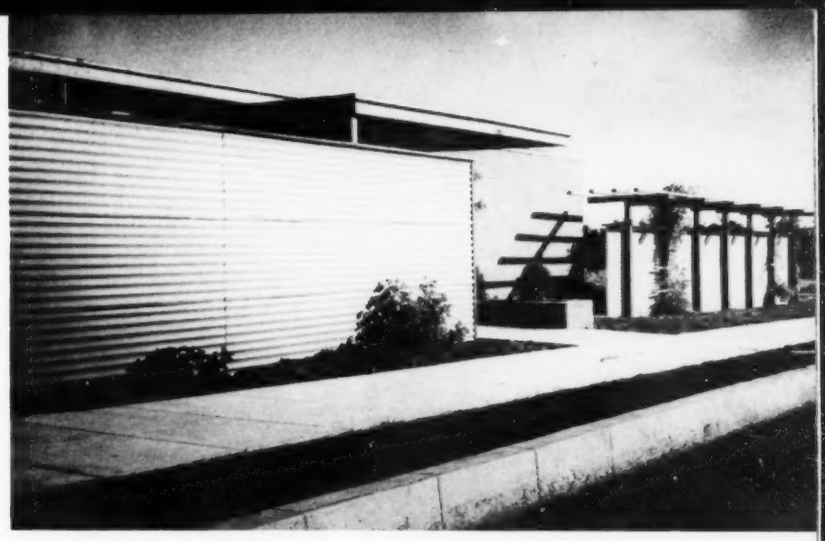
BEDROOM

LIVING ROOM

MAIN ENTRANCE is reached by a ramp; there are no changes in level throughout the house

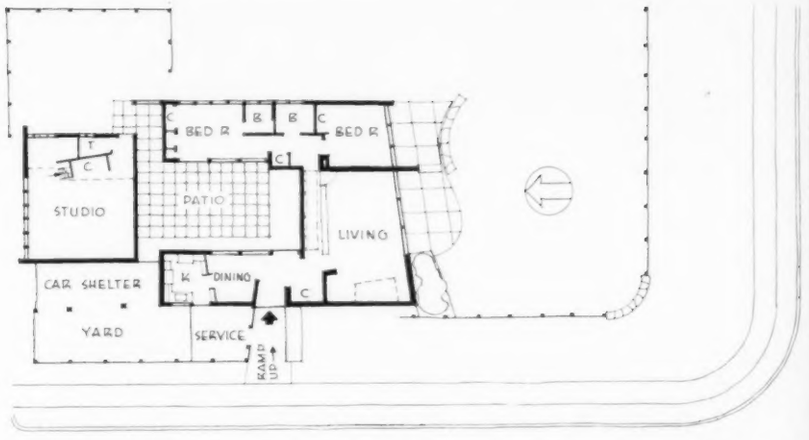
Photos by Fred R. Dapprich





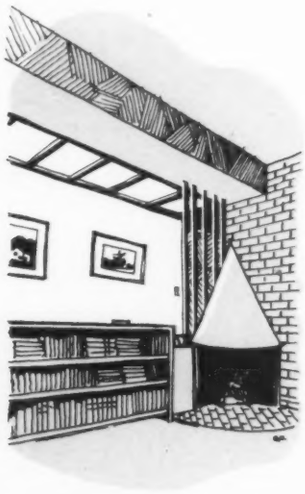
C. B. TROEDSSON, Architect

THIS STUDIO-RESIDENCE IN CLAREMONT, CALIF. for Mr. and Mrs. Milford Zornes provides privacy from the street and at the same time offers ample space for outdoor living. The studio is so located and equipped that it can be rented as a separate unit. Mr. Zornes, a painter, required wall space on which to hang his paintings; this is provided in the gallery (with skylight over), separated from living room by low bookshelves. Space for Mrs. Zornes' piano is provided at western end of living room, with skylight to left. Wall construction is stud with plaster or vertical shiplap redwood, and reinforced groutlock or brick construction. Roof ventilation is provided by continuous screen-covered openings under projecting eaves. Fence is of corrugated asbestos board, painted reddish brown.



C. B. TROEDSSON, ARCHITECT (continued)

TERRACE: looking from bedroom toward living room

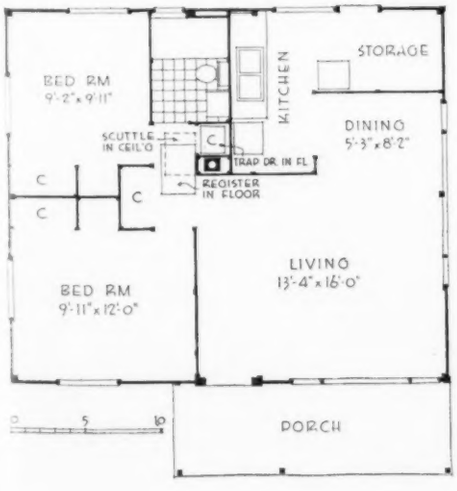


LIVING ROOM: A low bookcase partitions off the gallery where the owner shows his paintings. Note the flush skylight. At the right is a view of the opposite end of the room from which can be seen the terrace and garden

Photo by Orville K. Blake

JOHN B. PIERCE FOUNDATION, Robert L. Davison, Director of Housing Research

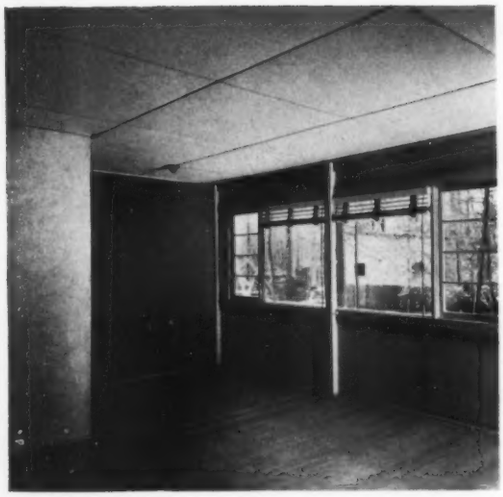
SKIDMORE, OWINGS & MERRILL, Consultant Architects

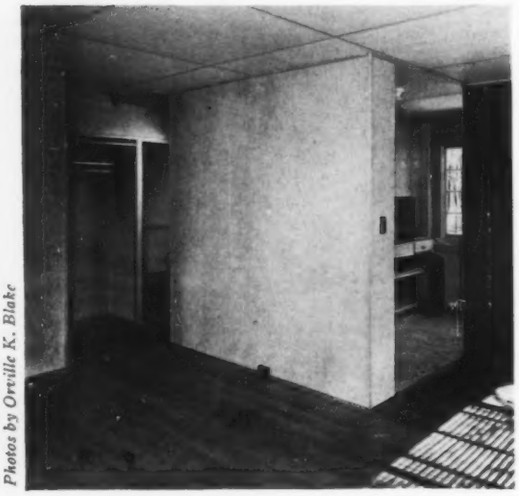


MOST RECENT of the experimental, low-cost houses developed by the John B. Pierce Foundation is this "skeleton frame and curtain wall" house built by the Stansbury Corporation near Baltimore, Md. Two elements are of special news interest: 1. The structural system. 2. A rationalized construction procedure which assigns items to the shop or the field according to where they are most economically handled; yet which does not conflict with existing craft organizations. Such operations as sizing, notching, etc., are handled in the shop or mill; actual assembly of elements is made a field operation.

As in previous houses researched by the Pierce Foundation (AR 1/34; 8/35; 10/36 and 9/39), plan elements, materials and construction methods were determined only after exhaustive pre-analysis and test, with no interest in or bias in favor of any particular material, equipment or system per se.

Detailing of the house for large-scale production required the development of an entire new type of drawing, combining architectural, structural and shop drawings, specifications and erection manual (see next page).





Photos by Orville K. Blake

TYPICAL INTERIORS

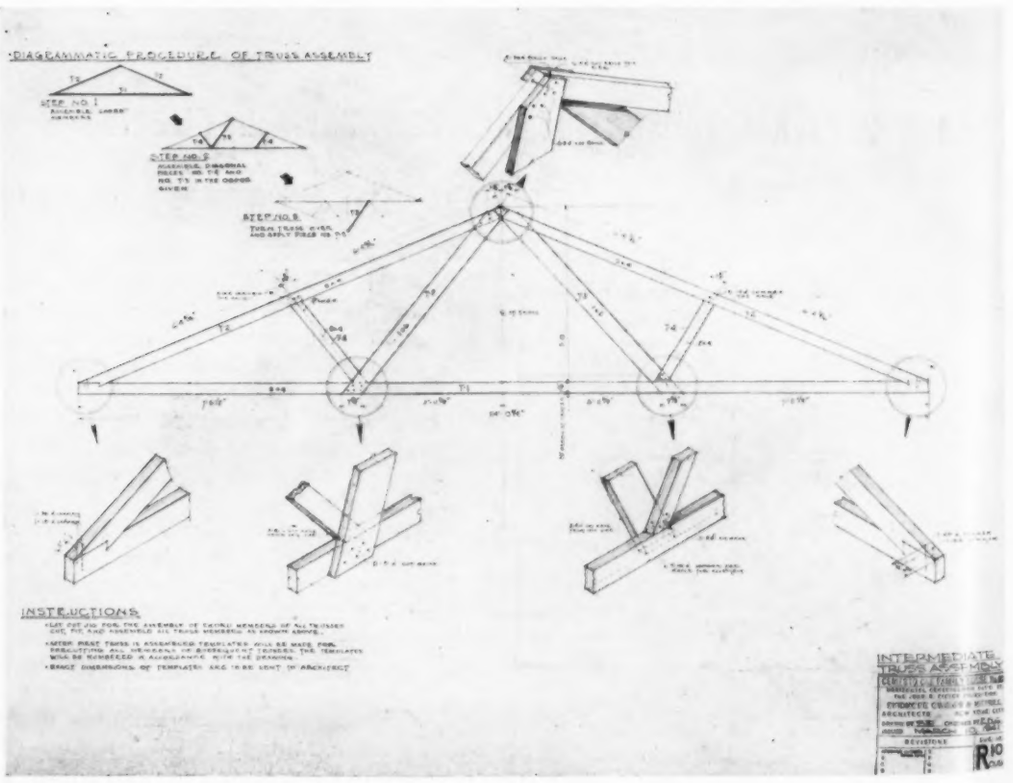
JOHN B. PIERCE FOUNDATION, Robert L. Davison, Director of Housing Research
SKIDMORE, OWINGS & MERRILL, Consultant Architects **(continued)**

THE NEW HOUSE utilizes a skeleton frame to which a curtain wall is attached. Unlike a usual bearing *wall* of traditional materials, either shop or job assembled, or a heavy panel unit assembly requiring special means for support and attachment, the curtain wall in the Baltimore house is simply a material, as it comes from the factory. All necessary components—exterior weather surface, insulation, and interior finished wall surface—are integrated into this single structural board, which is made up of an insulation board core veneered in manufacture with a ⅛-in. sheet of asbestos-cement on both faces. For exterior walls, a board with a 1½-in. insulation core is used; for interior partitions, the insulation core is ½ in. The use of this ready-made material instead of a curtain wall that must be assembled from a number of elements both materially reduces costs and overhead of a prefabricator, and simplifies and speeds erection.

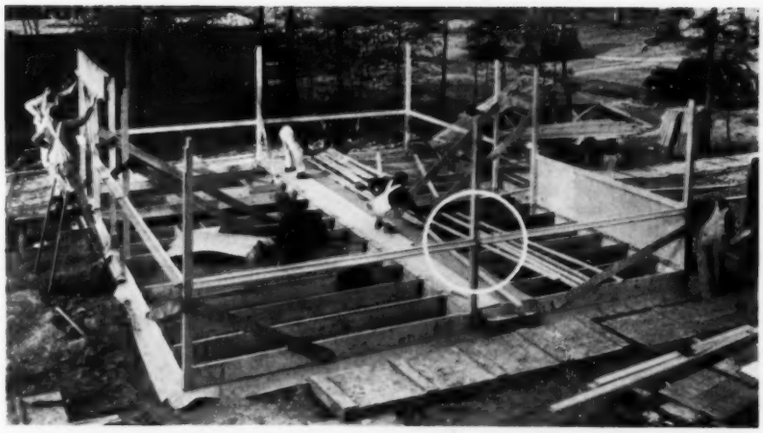
Members of the frame—4-by-4-in. wood columns spaced 12 ft. on centers, built-up sills, and plywood girders—come from the mill prefinished and pre-cut as to length, detail and profile. Sash and doors come from the manufacturer prefitted to frames for installation.

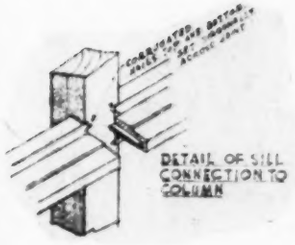
In arriving at the most economical use of materials, the Pierce Foundation concluded that the largest unit of a curtain wall material that is both convenient to use by hand labor at the site and that is generally commercially available is 4 by 12 ft. This explains both the 12-ft. centering of columns and the horizontal use of the board. Among advantages noted for the horizontal system:

1. Use of maximum size of available curtain wall material in simple rectangular sizes; if used vertically, more cutting of odd shapes as well as greater number of joints would have been necessary.
2. The horizontal sill member in the frame allows the architect any width or arrangement of windows desired. Had the board been used vertically, window widths would be limited to multiples of the width of the material.

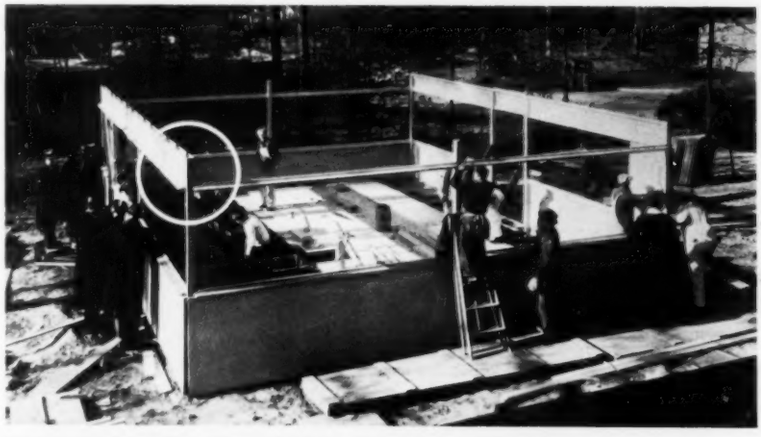


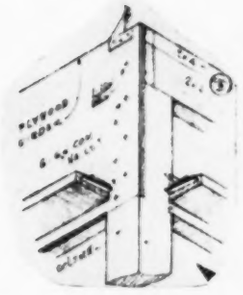
TYPICAL ARCHITECT'S DRAWING — all details (many in isometric), assembly instructions and specifications are included on each sheet. Entire set of drawings—about 60 sheets—is divided into 7 sections: Foundation; Exterior erection; Interior erection; Rough lumber; Millwork; Shop details; and Contract drawings. Each section, printed in a different color, is used only by the trade or fabricator involved. All details shown on the two following pages are taken directly from the originals



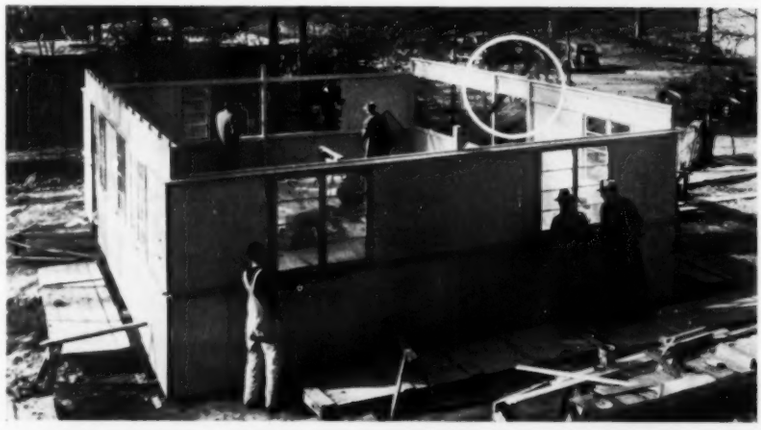


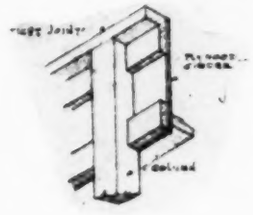
The skeleton frame is of 4-by-4-in. columns, sills and plywood girders



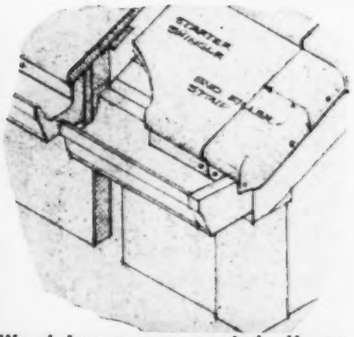


To this frame, the ready-made curtain wall material is attached



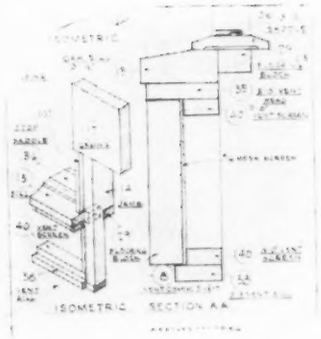


Sash and doors, prefitted to frames, are installed; joints are caulked

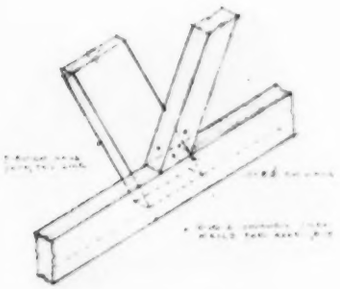


Wood trusses are erected. Heavy, asphalt-impregnated roofing, combining structural, insulation and waterproofing functions, applied on shingle strips. Gable end is a louvre vent

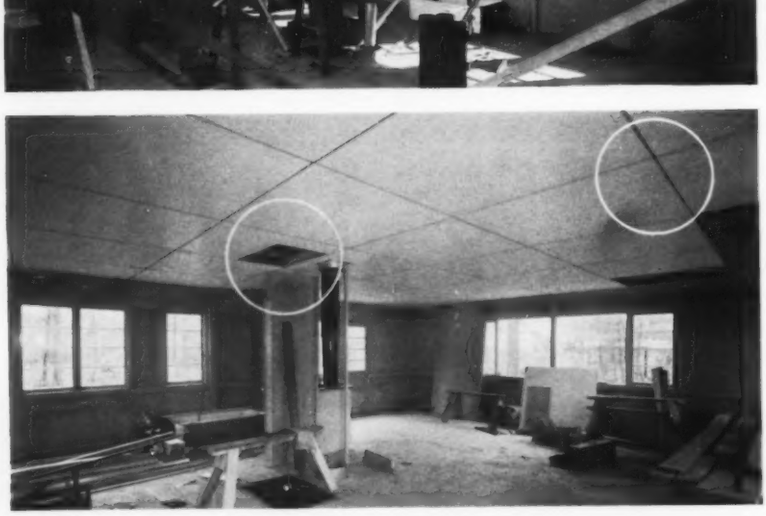
Photos by Eric J. Baker

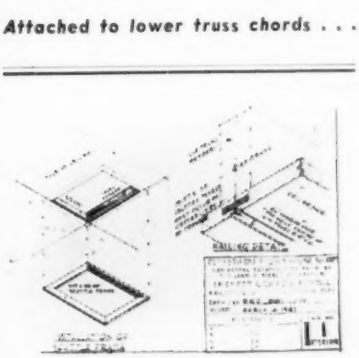


Interior view of wall elements in place

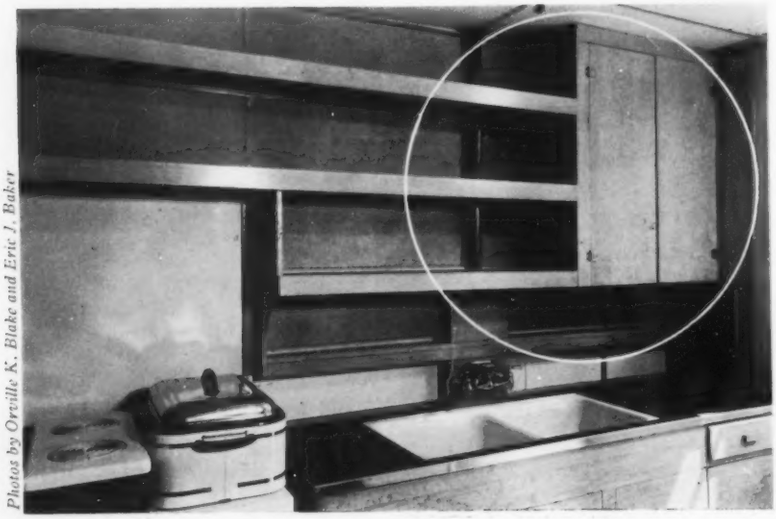


Attached to lower truss chords . . .

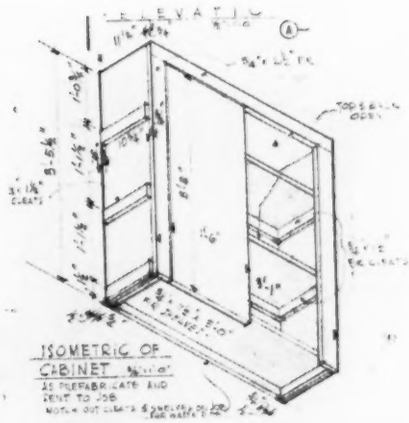




is a ceiling of insulation-board units



Photos by Orville K. Blake and Eric J. Baker



Cabinet work is precut for assembly

HOW SAFE IS THE HOME?

THE GENERALLY-ACCEPTED TRUISM that "home is the safest place" is nowadays cracking under an accumulating load of evidence to the contrary. Accidents in the home killed 32,000 people in 1939—a third of all accidental deaths, within 2 per cent of the number killed in motor accidents, and more than twice as many as were killed in industry. In addition, approximately 3,000,000 persons were injured in home accidents—about 375,000 of them suffering some permanent disability. Expressed in economic terms—wage loss, medical expenses, overhead cost of insurance—it is estimated that these accidents cost $600,000,000; property loss in home fires amounted to an additional $100,000,000. "As a cause of death and disability," says Dr. Donald B. Armstrong of the Metropolitan Life Insurance Co., "the home accident problem may significantly be compared with some of the hitherto major diseases of mankind, many of which have yielded to scientific control." Some idea of the epidemic proportions of the problem may be gathered from the fact that *home accidents are the eighth most important cause of death*—exceeded only by heart disease, cancer, cerebral hemmorrhage, nephritis, pneumonia, tuberculosis and motor accidents!

Human fallibility to blame?

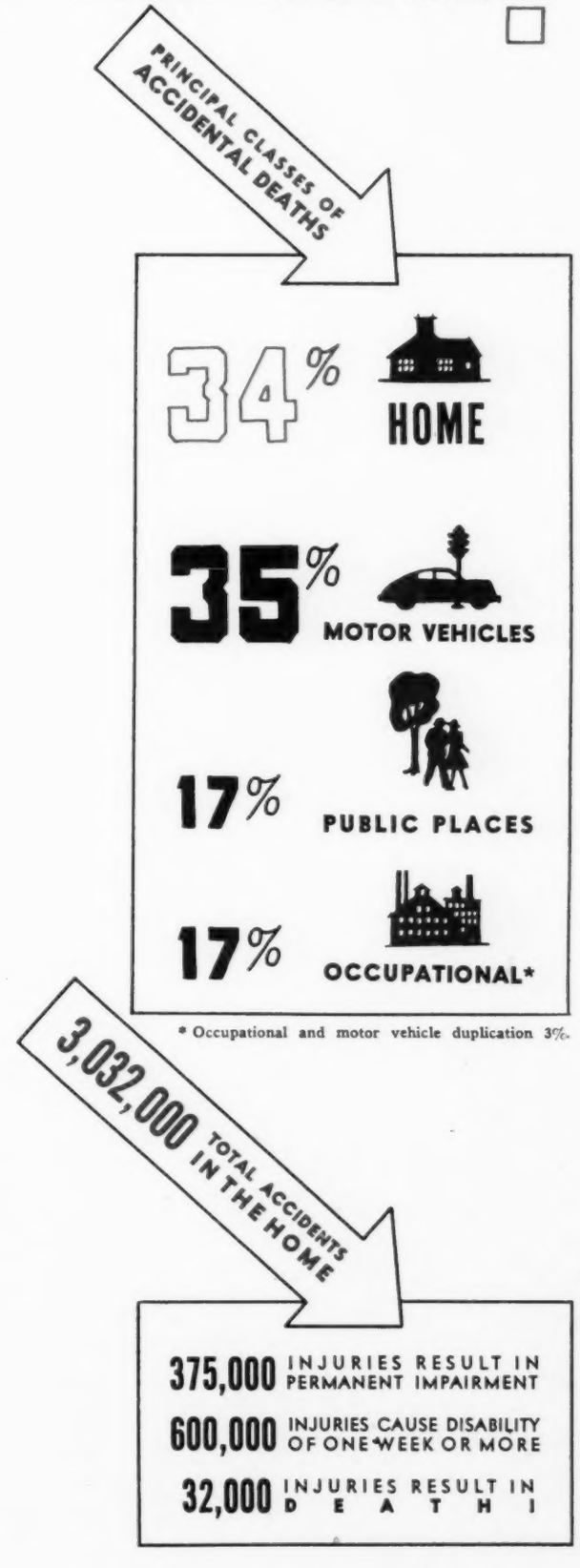
What causes these accidents? How can they be reduced? For a clue to the answers to these questions the architect might turn to industry, where scientific research and control and preventive measures have resulted in a "*69 per cent reduction in accident frequency* and a *50 per cent reduction in accident severity* in the period from 1926 to 1939 inclusive." Such facts indicate that the problem of home accidents can be objectively attacked and drastically reduced—but only from a similarly scientific point of view.

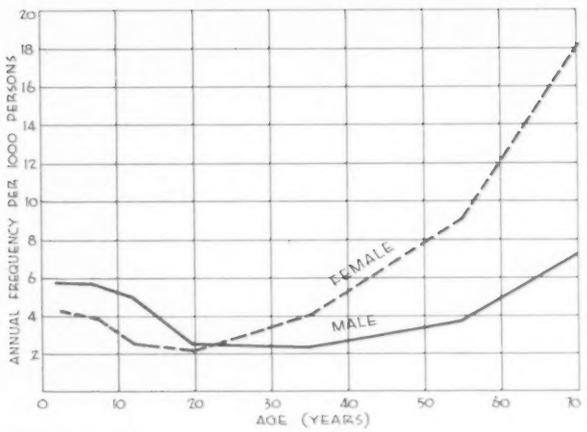
Naturally, no house can be 100 per cent accident-proof. The factor of human fallibility enters into the use of a house just as it does that of a motor car, so that intensive education of the home owner must parallel an increased safety factor in the design. But, in a statistical sense, the main burden of blame rests on the house, not the user. This is made clear by recent surveys (see charts, next page) which show that home accidents of a given type happen to people of given age and sex, while occupied with given tasks, at given places in the house.

There is, on the basis of available material, no way of telling whether the percentage of home accidents is higher in old houses than in new, or in non-architect designed houses than in those architect-designed. The chances are probably in favor of new, architect-designed structures. But even here the margin is not as large as might at first be expected. Figures seem to indicate that higher priced housing is only moderately less dangerous to users than the slums themselves (see next page).

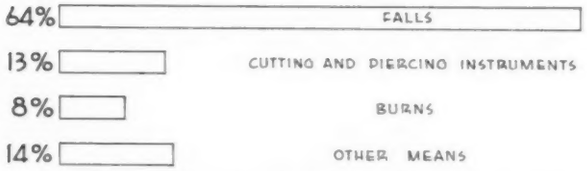
Safety is not accidental

Many danger points in house design are unconsciously

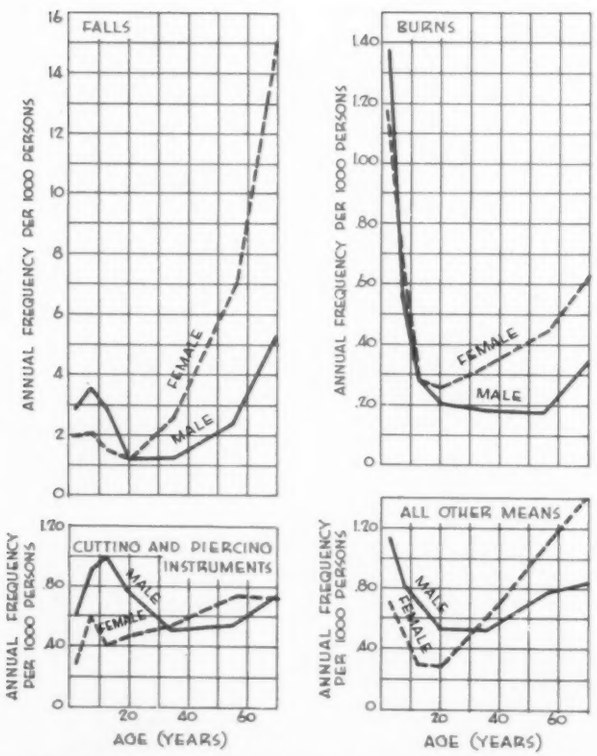




ANNUAL FREQUENCY (per 1,000 persons) OF HOME ACCIDENTS DISABLING FOR A WEEK OR MORE. Note that after 20 years—i.e., the age when most women become housekeepers—the rate for women overtakes that of men. Earlier lead of males is probably due to fact boys are more active and adventurous than girls*



TWO-THIRDS OF ALL ACCIDENTS DISABLING FOR A WEEK OR MORE ARE DUE TO FALLS, which indicates that movement—under even the best conditions—is a dangerous operation. Here, as on the highway, scientific "traffic planning" is in order*



ACCIDENTS IN THE HOME ARE BY WAY OF BEING "OCCUPATIONAL" IN NATURE where adult women are concerned. Notice for example how sharply their curve on burns (top, right) overtakes and passes that of men at 20 years*

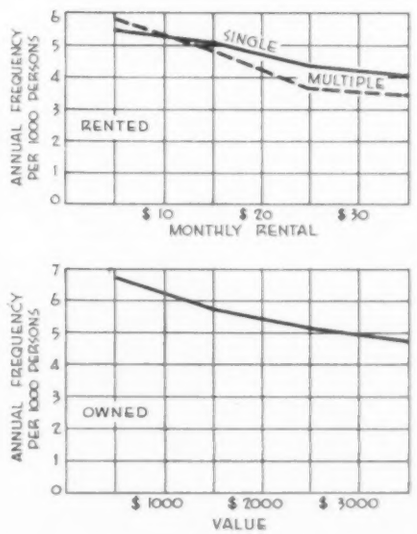
avoided by a good architect without his being conscious of the safety issue per se. But many other danger points *remain* because of the same approach. Accidents in the home are the result of characteristic movements and processes which require the closest scrutiny by the architect if they are to be prevented. This does not always imply change in the design. Thus an interior stairway may be inherently dangerous because it is steep, slippery, badly lighted or winding; but it may also be dangerous because the only phone is at its foot and the housewife is always in a hurry when running down to answer it. The first instance might indicate need for redesign of the stair; the latter might indicate need for two phones. Another set of factors for which the architect can only indirectly be held responsible are collisions with furniture in a dark bedroom or stumbling over toys in the living room (both statistically important as a source of injury). In the first case, if the architect's plan *anticipates* the necessary furniture, it will largely determine its placement. In the second case, if he provides supervised play space or (at the minimum) storage space for toys, the child is much likelier to be taught to put his toys away.

Safety is cheaper in the long run

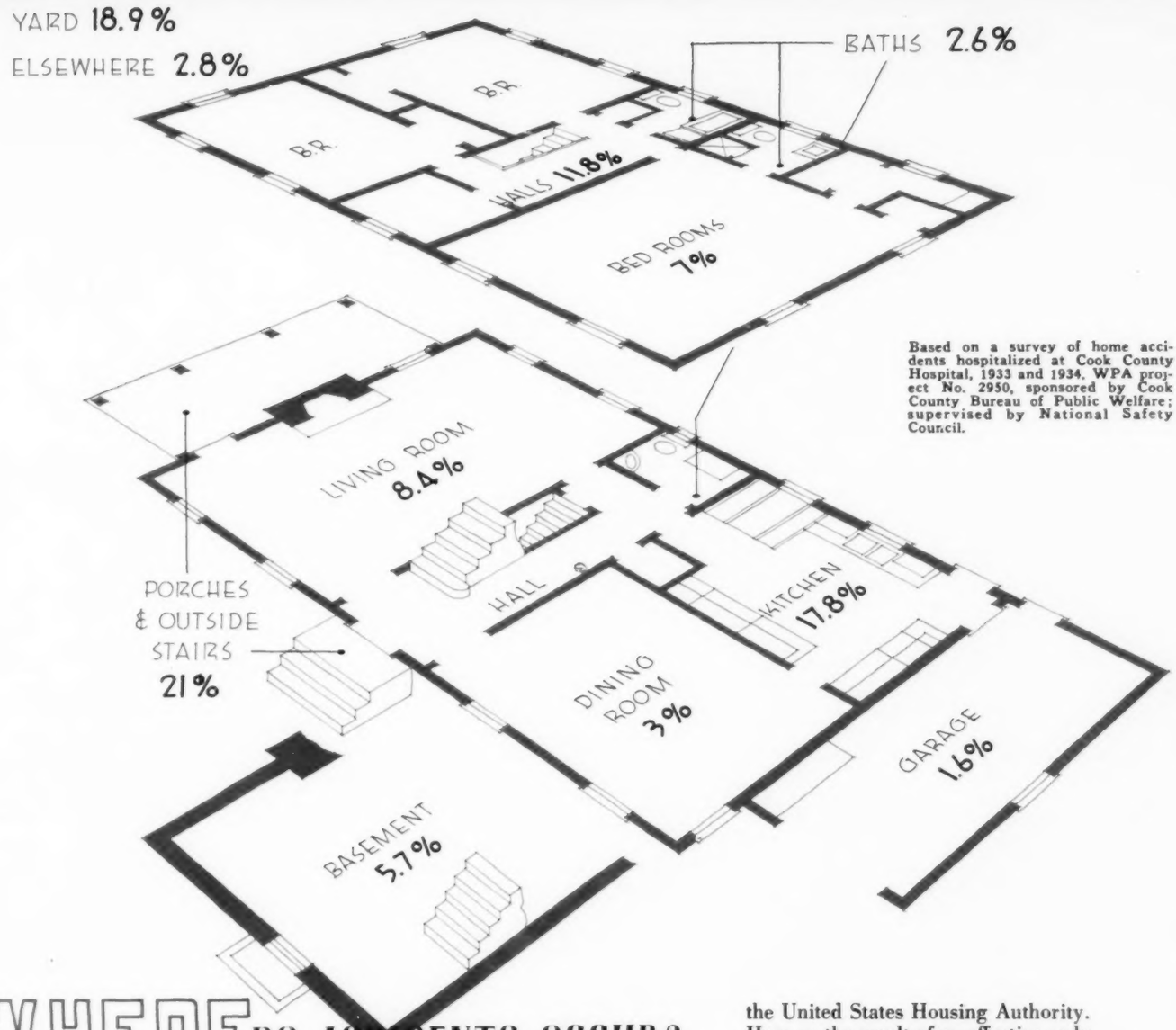
The fact is that it is the architect, and the architect alone, who determines the "safety factor" of the house. The manufacturer of a non-slip flooring material or an efficient lighting fixture can only produce the product; it is the architect who decides whether or not to use it and, if so, how. Although the initial cost of many safety features may be higher, in the long run they cost less. This is true not only in a general statistical sense (such as Dr. Armstrong's estimate of $600,000,000 annual loss), but in a concrete and specific way (such as USHA's 98 per cent reduction in costs of liability insurance and 59 per cent reduction in fire insurance). Safety can be made to pay its way!

*Source: *"Home Accidents as Recorded in the National Health Survey"* by Britten, Klebba and Hailman. Public Health Reports, Vol. 55, No. 45. November 1940.

†Source: *"Certain Characteristics of Urban Housing"* by Britten, Brown and Altman. Milbank Memorial Fund Quarterly, Vol. XVIII, No. 2, April 1940.



THE MORE EXPENSIVE HOME OR APARTMENT IS NOT NECESSARILY SAFER THAN ITS CHEAPER COUNTERPART. This would seem to indicate that safety depends as much upon the way in which the house is designed as upon the materials out of which it is built†



Based on a survey of home accidents hospitalized at Cook County Hospital, 1933 and 1934. WPA project No. 2950, sponsored by Cook County Bureau of Public Welfare; supervised by National Safety Council.

WHERE DO ACCIDENTS OCCUR?

NOT ALL AREAS of the house are equally dangerous, nor are the various types of accidents evenly distributed through the house. Thus outside stairs and porches are over seven times as dangerous as the bathroom, while falls are twice as prevalent on outside stairs and porches as in the bathroom. This of itself constitutes impressive proof that accidents in the home are not due merely to "human nature" but to very specific factors which can be anticipated and largely eliminated by the canny architect. Where there's an accident there's a reason; and this reason may be partly due to what experts in the field call "unsafe conditions" and partly to "unsafe practices." Here reference to industrial experience may come in handy. In industrial safety work, percentages and types of accidents are correlated with the type of work being done in those departments. Three major factors are investigated: the condition of the building itself; the process carried on in the building; and the practice of the workers. Reduction of the accident rate may involve any or all of the three.

The same analysis may be fruitfully applied to residential design. What characteristic processes are carried on in a kitchen? To what extent can the design of the room itself increase its safety (omission of live storage space above eye-level, inclusion of electric dishwasher, etc.)? To what extent can the process itself be made safer (e.g., elimination of deep fat frying or washing of cutlery by hand)? And to what extent must the housewife herself learn safe practices in housework (to cut bread *away* from the body, to keep poisonous or explosive chemicals clearly marked and closely locked)?

In the first two categories the architect is clearly in a position to reduce accidents, although the only large scale opportunity to apply this technique in the building field has been in the United States Housing Authority. Here, as the result of an effective code of safety standards in design and construction, an exceptionally favorable safety record has been established as compared with average annual frequencies:

> General accident rate per thousand—4.65
> USHA accident rate per thousand—1.85
> *i.e., a 61% reduction!*

Investigation showed that a further reduction in accidents of 31 per cent and in fires of 59 per cent might have been achieved by safer planning and designing.*

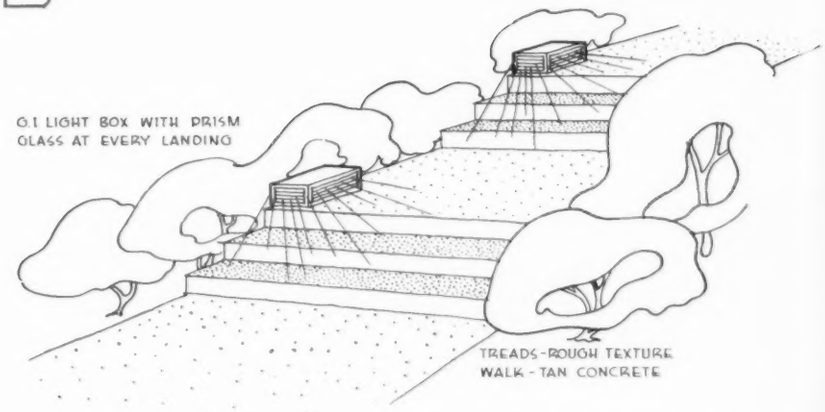
"Ordinary care in eliminating physical hazards in buildings is not adequate protection," says the Greater New York Safety Council. "*Extraordinary care, constant inspection, prompt maintenance and repair* are required to assure the minimum . . . personal injuries." Thus, in the following pages, are presented detailed suggestions for raising the safety factor of the average American home.

*Results of USHA's experience in this field are summarized in an excellent new pamphlet *Planning for Safety*, recently published by the Authority, and source of many of the specific suggestions in this study.

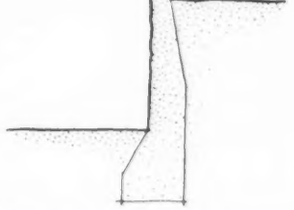
HOW SAFE IS THE YARD

PERCENT OF ALL ACCIDENTS	18.9%
Falls	**72.8**
on stairs	.7
on floors	.3
on rugs	
on walks or ground	27.9
from chairs, tables	.4
from windows	.7
from ladders or scaffolds	4.2
from fences	7.4
from other outside elev.	17.2
over objects	10.4
in or out of bed	1.2
all others	2.4
Struck by flying, falling objects	**5.6**
Stepping on, striking against object	**5.8**
coll. with inanimate obj.	
nail or splinter	
needles, pointed objects	
Handling, lifting, carrying	**2.9**
Burns, scalds, explosions	**3.7**
by gasoline, cleaners	
by steam, hot liquids	
all others	
Asphyxiation, suffocation	
Firearms	**.9**
Poison (excl. poisonous gas)	
by food	
all others	
Cut or scratch	**3.2**
Bitten by animals	**.5**
Foreign bodies	**.5**
Hand caught in wringer	
All others	**4.1**

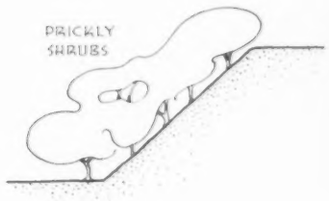
Source: National Safety Council.



Where topography makes outside stairs necessary, an arrangement such as this is a definite safety factor—short flights of easy stairs, lighted from below eye level, and interspersed with platforms. John E. Dinwiddie, Architect



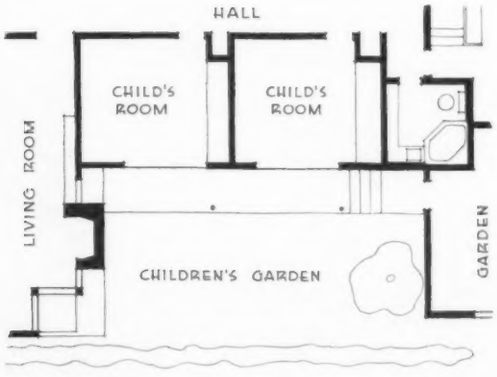
Where retaining walls are necessary, they should be topped by railing or fencing which is high and solid enough to prevent children pushing through or climbing over



Terracing is a much safer way of handling sharp changes in contours. Prickly shrubs will discourage "short-cuts," reduce maintenance and prevent erosion

Roger Sturtevant

Elimination of any small, sharp changes in grade, in yard around living areas, is important —especially where the plan is "open." William Wilson Wurster, Architect



Protected play area, easily supervised from house, is biggest safety factor where small children are concerned. Gregory Ain, Designer

THE YARD—The location of almost one-fifth of all home accidents is precisely that area over which the architect all too often has no control — the yard. He usually determines the location of the house, and its immediate relation to the ground around it; but the development of the plot is too often left to chance. In general the same rules — separation of function, provisions for traffic, careful design where abrupt changes in level occur, adequate lighting of walkways — apply as to the design of the house itself.

PLAYSPACES — In spite of the fact that there are children in most single-family houses, special areas are seldom set aside for their play in the plot plan. The majority of accidents occuring "outside the house" involve young children, for whom there is no real alternative to supervision. Such areas should thus be located so that they can be observed from the house, and should preferably be level and free from obstructions. If equipment is included regular playground standards should be observed both in design and placement.

FIRE—In those parts of the country where dry seasons occur, or in many rural locations, brush and grass fires represent a real safety hazard. In such cases, development of the grounds should provide for an easily-maintained "fire belt" around the house.

HOW SAFE IS THE GARAGE

PERCENT OF ALL ACCIDENTS	1.6%
Falls	**25.9**
on stairs	1.2
on floors	3.7
on rugs	
on walks or ground	
from chairs, tables	
from windows	
from ladders or scaffolds	6.2
from fences	
from other outside elev.	7.4
over objects	7.4
in or out of bed	
all others	
Struck by flying, falling objects	**27.2**
Stepping on, striking against object	**14.8**
coil, with inanimate obj.	6.2
nail or splinter	6.2
needles, pointed objects	2.4
Handling, lifting, carrying	**9.9**
Burns, scalds, explosions	**8.6**
by gasoline, cleaners	6.2
by steam, hot liquids	
all others	2.4
Asphyxiation, suffocation	**2.5**
Firearms	
Poison (excl. poisonous gas)	
by food	
all others	
Cut or scratch	**4.9**
Bitten by animals	
Foreign bodies	
Hand caught in wringer	
All others	**6.2**

Controls for garage doors which are operated by or from the car may prevent many a fall on icy pavements

ALTHOUGH RELATIVE TO OTHER AREAS of the house, few accidents occur in the garage, it is the scene of many fatal accidents—notably those caused by carbon monoxide poisoning — and serious accidents caused by fires and falls.

GOOD VENTILATION is naturally the best guarantee against monoxide poisoning. In most parts of the country this is a simple matter—open sides ("carport"), open eaves or louvered gable ends. In more severe climates, natural ventilation may not be desirable. Here, easily or perhaps mechanically operated doors are the surest guarantee that owner will open them before starting motor.

Spontaneous combustion often occurs in oily wastes, while greasy floors cause both bad falls and bad injuries. Adequate space for storage and repair should encourage "safer practice" on the owner's part, while a fireproof floor with drain whose surface is the equivalent of sand float or scored concrete, should reduce falls and fires.

SPECIAL CARE should be taken, in laying out drives and turn-arounds, that easy grades and maximum visibility are obtained. Many automobile accidents occur right in the yard.

OLD TREES which are not sound and/or not checked by competent tree surgeons constitute another hazard, if close enough to strike the house in falling — either from lightning, wind- or ice-storms.

STORAGE FOR GARDEN TOOLS is important. Many serious falls occur from tripping over garden tools; an upturned rake is particularly dangerous. Racks should be located for this equipment in a convenient spot.

GARDEN POOLS are dangerous where there are young children, who have been known to fall in, striking their heads against rocks and drowning before regaining consciousness. Heavy bird baths and statuary likewise present hazards unless firmly secured to a base which is likewise firmly anchored in the ground.

WHERE STEEP GRADES are involved terraces are safer than retaining walls; they may be planted with prickly shrubs to discourage short cuts, hold soil, and reduce maintenance. Where grade difference is considerable, retaining walls should extend above upper level, or be topped with fencing or chains. Railings and fences should be designed to discourage children climbing or squeezing through them. Never use "barbed wire" or low inconspicuous wires to deflect traffic; instead use clearly visible fencing.

ALL GUY WIRES for newly planted trees should have white markers.

THE NUMBER of outside steps should be held to a minimum. House and open areas should be arranged to reduce the number of slopes and abrupt changes in grade which will necessitate steps. House plans can frequently be adapted to sloping sites in such a way as to substitute interior stairs for outside steps.

WALKS

1. *Proper pitch for drainage* both lengthwise and crosswise. The crosswise slope should never exceed ½ in. per ft. A slope of ¼ in. per foot is recommended.
2. *Careful location of catch basins.* The gratings should not be located within the walk proper but in a depressed area 2 ft. or more from the walk. Top of gratings should be approximately 3 in. below the walk level.
3. *Conservative slopes.* Steep slopes are hazardous, especially on the north side of buildings where walks are more likely to be covered with ice or snow.
4. *Careful location of walks in relation to downspouts.* Water should not drain directly across walks, particularly in localities where frequent freezing may occur.
5. *Nonslip walk surfacing.* This should be comparable in finish to sand float or scored cement. Concrete surfaces should not be sprinkled with neat cement during finishing and should not be steel-trowel finished. Surfacing with open joints in which high heels might catch should not be used.

STEPS

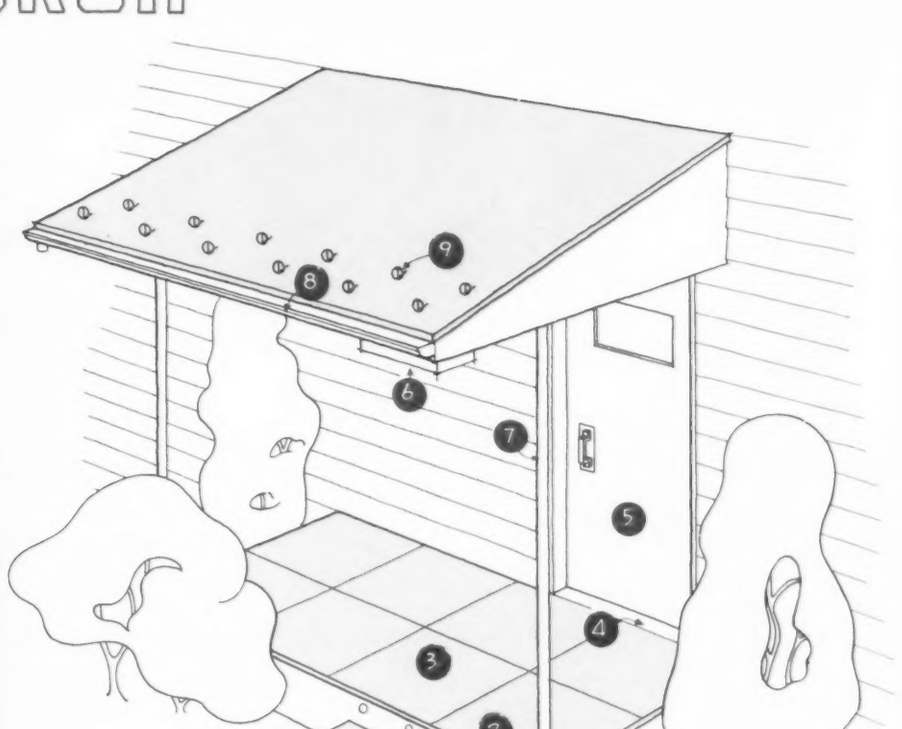
1. *Conservative gradients.* Outside steps should be no steeper than 10 in. tread and 7½-in. rise.
2. *Uniform ratio of tread width to riser height* for each flight of steps, and for all steps in the same general area.
3. *Elimination of short step run.* Steps should be provided only where three risers or more are necessary. A sloping walk of low gradient can be used where the change in grade would otherwise require only one or two steps.
4. *Handrails and landings* for long step runs and where special protection is needed. Grass areas are desirable adjacent to steps which are not protected by handrails.
5. *Nonslip treads.* Step surfaces should be finished in the same manner as walk surfaces: a finish comparable in traction to sand float or scored cement.

Ramp slopes should not be steeper than 1 to 8 and the surfaces should be nonslip. Combination stairs and ramps are not desirable. Ramps should be provided with hand-rails. Windows with out-swinging sash should not be located over ramps.

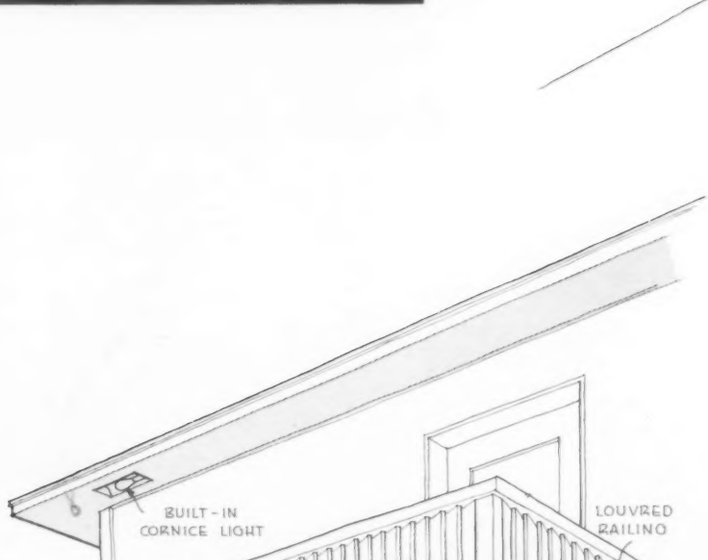
HOW SAFE IS THE PORCH

PERCENT OF ALL ACCIDENTS	21.0%
Falls	**92.2**
on stairs	60.2
on floors	3.5
on rugs	.2
on walks or ground	.5
from chairs, tables	.6
from windows	.4
from ladders or scaffolds	.8
from fences	.1
from other outside elev.	24.0
over objects	1.4
in or out of bed	.3
all others	.2
Struck by flying, falling objects	**.8**
Stepping on, striking against object	**3.1**
coll. with inanimate obj.	1.6
nail or splinter	1.1
needles, pointed objects	.4
Handling, lifting, carrying	**.7**
Burns, scalds, explosions	**.6**
by gasoline, cleaners	.4
by steam, hot liquids	.1
all others	.1
Asphyxiation, suffocation	**.1**
Firearms	**.1**
Poison (excl. poisonous gas)	**.3**
by food	
all others	.3
Cut or scratch	**.7**
Bitten by animals	**.2**
Foreign bodies	**.2**
Hand caught in wringer	**.1**
All others	**.9**

Source: National Safety Council.



1. Hold number of steps to minimum, with approx. 7½-in. riser to 10-in. tread. Non-slip, light-colored surface. 2. Counter-sunk reflectors. 3. Non-slip, level surface. 4. Minimum change in level at door. 5. No glass at bottom or pushing area of door. 6. Downlighting for steps. 7. Posts difficult for children to climb. 8. Gutter. 9. Snow guards for cold climates.

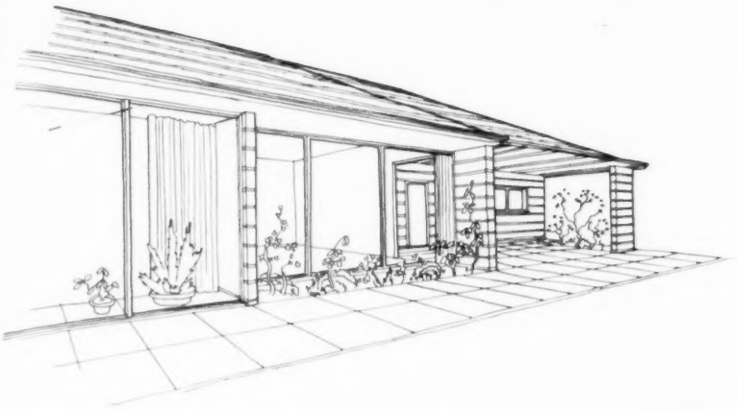


Where ventilation is a problem, balcony railings might be of vertical louvers; where solid materials would cut off necessary light, wire-glass railings might be substituted. Note combined yard and burglar light in cornice

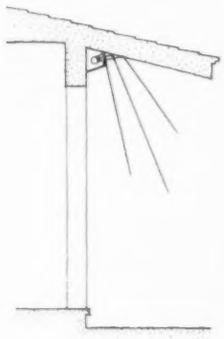
THE PORCH AND OUTSIDE STAIR are the scene of 21 percent of all home accidents—they are, in other words, the most dangerous elements in the house. Moreover, 92 percent of these accidents are due to falls, which indicates that the architect's chief problem is one of "traffic control." Here three factors are of crucial importance: (1) absolute minimum in grade changes; (2) non-slip, protected stairs; and (3) adequate lighting for porches, stairs and walks.

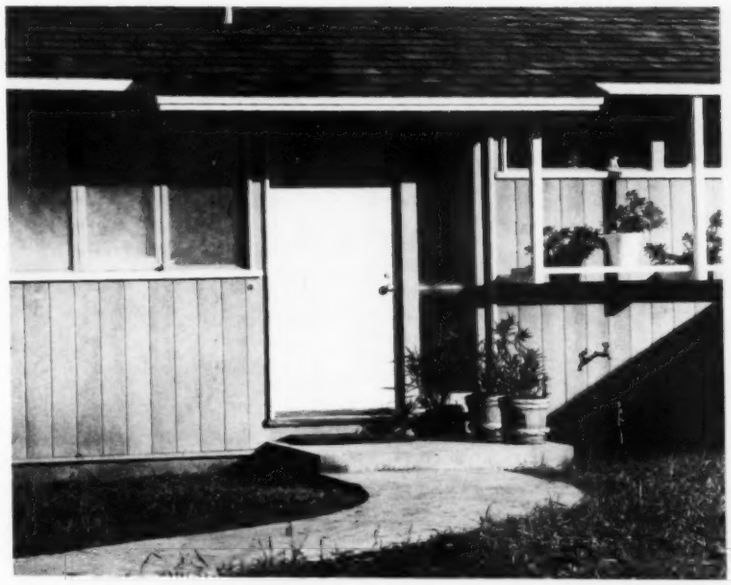
ENTRANCE PLATFORMS, according to USHA, should be only *one step* above grade. Where this is not possible, stairs and platforms should have railings, and should be protected from rain, sleet and snow. Porch and stoop roofs should be equipped with gutters and—in areas where snow is heavy—snow guards.

SECOND FLOOR PORCHES and balconies should have toe boards and high railings. These should be designed to discourage children from climbing over or pushing through them.



Here differentials in floor and terrace levels are held to a minimum while glass wall of living and dining rooms lights the entire area. John Ekin Dinwiddie, Architect



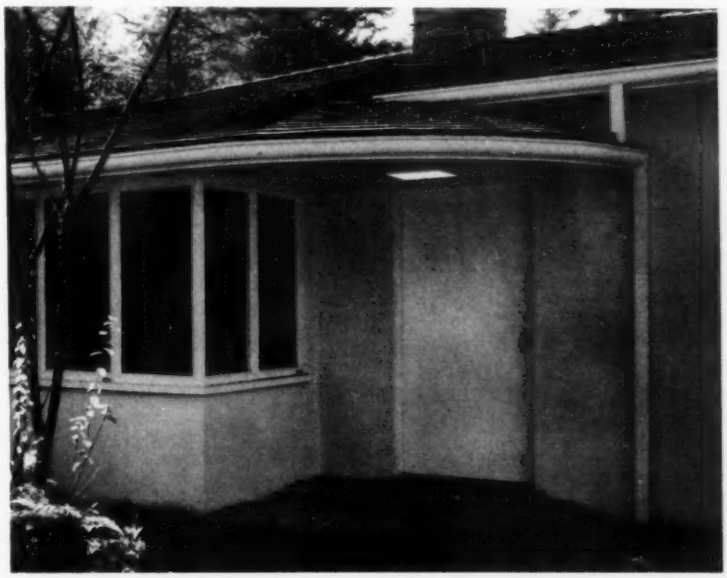


This entrance meets most requirements for safety — indirect lighting, solid wood door, protected platform and step, minimum number of steps. Door sill might have been somewhat lower, since average person does not expect a change in floor level which comes right at door. John Ekin Dinwiddie, Architect

PORCHES AND TERRACES should also be at or very near finished floor level. Rough flagging or brick paving which might catch high heels should be avoided in areas where traffic is heavy.

Where porches are screened, they should have sturdy railings and frames, since insecurely fastened screens often give a deceptive sense of security.

ADEQUATE LIGHTING of porches, platforms and steps should be of conservative intensity but wide distribution. A bright, unshielded bulb at or near eye level may prove more hazardous than none at all, especially if located so that one walks into it. The use of built-in eave lights —already widespread in some parts of the country as a protection against burglary—are also a safety measure since, if properly designed, they can illuminate the entire yard. Small reflectors (such as used on highway signs) counter-sunk in walks or steps are another economical safety measure.



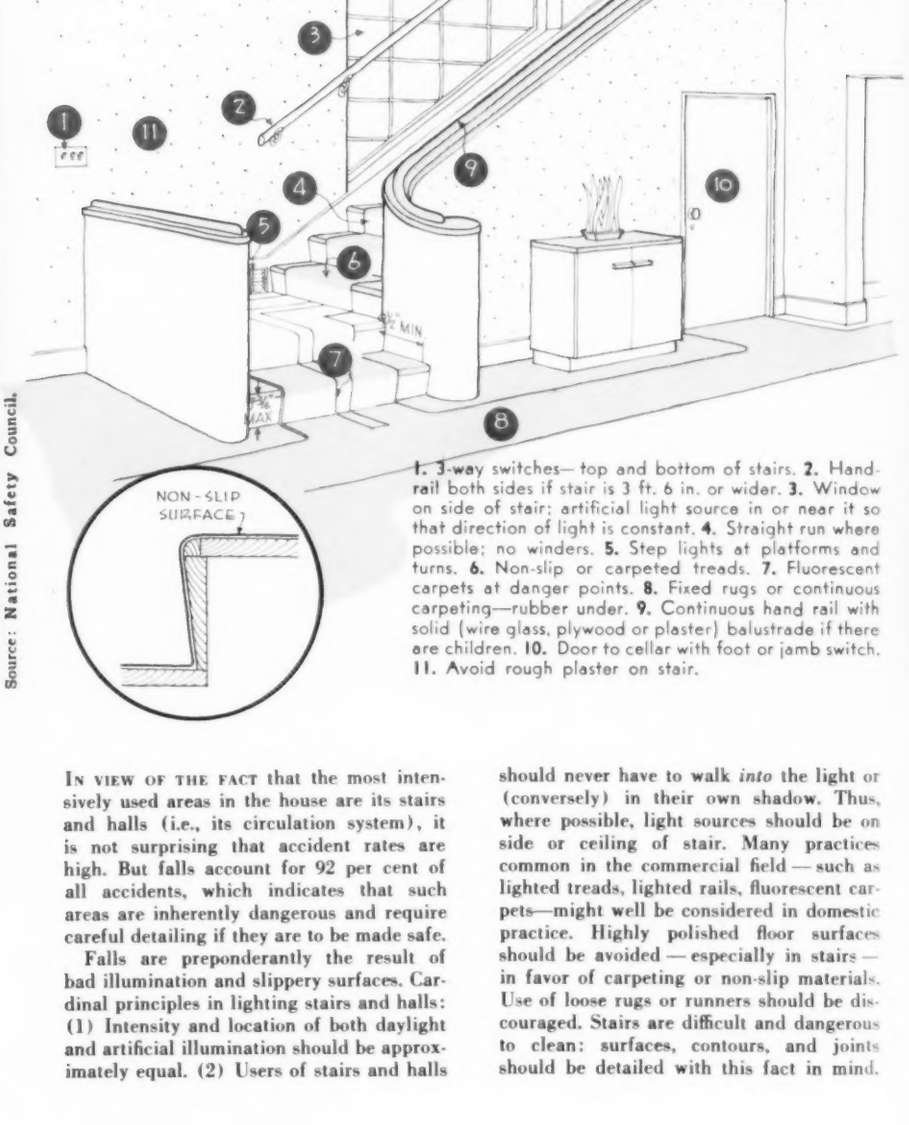
Roger Sturtevant

Another entrance where accident hazard is reduced to minimum—built-in down-lighting, solid door, guttered roof, 4-in. differential between floor and grade. Van Evera Bailey, Architect

HOW SAFE IS THE INSIDE STAIR AND HALL

PERCENT OF ALL ACCIDENTS	11.8%
Falls	**92.3**
on stairs	80.3
on floors	3.8
on rugs	2.4
on walks or ground	.7
from chairs, tables	
from windows	1.1
from ladders or scaffolds	1.1
from fences	
from other outside elev.	.2
over objects	1.8
in or out of bed	.4
all others	.5
Struck by flying, falling objects	**.9**
Stepping on, striking against object	**2.4**
coll. with inanimate obj.	1.1
nail or splinter	.5
needles, pointed objects	.8
Handling, lifting, carrying	**.5**
Burns, scalds, explosions	**.8**
by gasoline, cleaners	.2
by steam, hot liquids	.2
all others	.4
Asphyxiation, suffocation	
Firearms	**.8**
Poison (excl. poisonous gas)	
by food	
all others	
Cut or scratch	**.8**
Bitten by animals	
Foreign bodies	
Hand caught in wringer	
All others	**1.5**

Source: National Safety Council.



1. 3-way switches— top and bottom of stairs. 2. Handrail both sides if stair is 3 ft. 6 in. or wider. 3. Window on side of stair; artificial light source in or near it so that direction of light is constant. 4. Straight run where possible; no winders. 5. Step lights at platforms and turns. 6. Non-slip or carpeted treads. 7. Fluorescent carpets at danger points. 8. Fixed rugs or continuous carpeting—rubber under. 9. Continuous hand rail with solid (wire glass, plywood or plaster) balustrade if there are children. 10. Door to cellar with foot or jamb switch. 11. Avoid rough plaster on stair.

Source: National Safety Council.

IN VIEW OF THE FACT that the most intensively used areas in the house are its stairs and halls (i.e., its circulation system), it is not surprising that accident rates are high. But falls account for 92 per cent of all accidents, which indicates that such areas are inherently dangerous and require careful detailing if they are to be made safe.

Falls are preponderantly the result of bad illumination and slippery surfaces. Cardinal principles in lighting stairs and halls: (1) Intensity and location of both daylight and artificial illumination should be approximately equal. (2) Users of stairs and halls should never have to walk *into* the light or (conversely) in their own shadow. Thus, where possible, light sources should be on side or ceiling of stair. Many practices common in the commercial field — such as lighted treads, lighted rails, fluorescent carpets—might well be considered in domestic practice. Highly polished floor surfaces should be avoided — especially in stairs — in favor of carpeting or non-slip materials. Use of loose rugs or runners should be discouraged. Stairs are difficult and dangerous to clean: surfaces, contours, and joints should be detailed with this fact in mind.

ANGLES OF ASCENT for ramps, stairs, and ladders — well known, but still too often ignored. Changes in floor level should never be *less than* two steps; winders should be avoided

RAMPS require more space than stairs but are otherwise less expensive. They offer fewer hazards and are much easier and safer to clean and maintain. A solid wire-glass balustrade transmits light, keeps children from climbing up or pushing through

Ohio Rubber Co.

HOW SAFE IS THE BATH

PERCENT OF ALL ACCIDENTS	2.6%
Falls	**40.5**
on stairs	.8
on floors	21.4
on rugs	
on walks or ground	1.6
from chairs, tables	.8
from windows	4.8
from ladders or scaffolds	.8
from fences	
from other outside elev.	.8
over objects	1.6
in or out of bed	
all others	7.9
Struck by flying, falling objects	**4.8**
Stepping on, striking against object	**5.6**
coll. with inanimate obj.	
nail or splinter	
needles, pointed objects	5.6
Handling, lifting, carrying	
Burns, scalds, explosions	**15.8**
by gasoline, cleaners	
by steam, hot liquids	8.7
all others	7.1
Asphyxiation, suffocation	
Firearms	
Poison (excl. poisonous gas)	**16.6**
by food	
all others	16.6
Cut or scratch	**7.1**
Bitten by animals	
Foreign bodies	**1.6**
Hand caught in wringer	**4.8**
All others	**3.2**

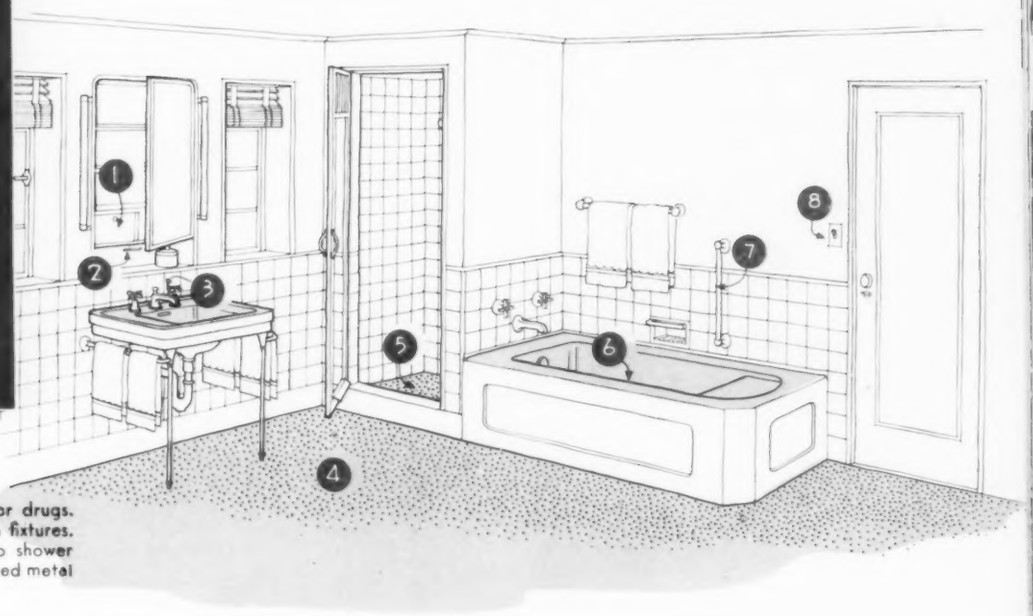
Source: National Safety Council.

ALTHOUGH — contrary to popular belief — fewer accidents occur in the bathroom than in any other single area in the house, many serious falls, burns and poisonings do occur here.

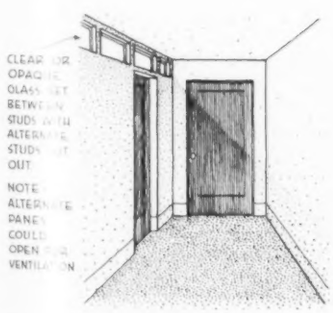
Flat-bottomed tubs with rolled rims providing a continuous grab support are recommended by USHA, while importance of non-skid floors in shower stalls is obvious. Towel and grab bars, soap dishes and fixture handles should be metal, as serious cuts often occur with china ones. Manual or thermostatically controlled mixing valves on showers have prevented many a serious scalding.

A night light controlled by a switch in the door jamb is a safety feature. All switches should be located so that they cannot be manipulated from bathtub or lavatory; all individual lights should be operated by a pull cord. If required, electric heaters should be built-in.

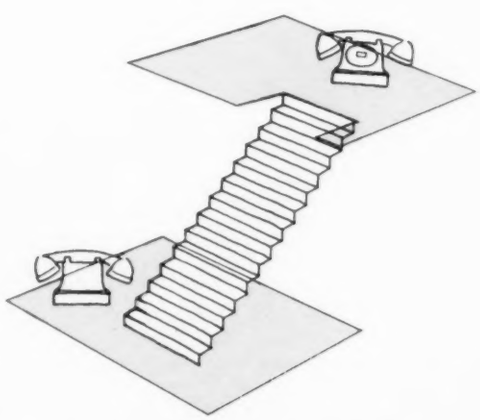
Since used razor blades in waste baskets are a real hazard, a razor blade slot is desirable, as is a locked and lighted compartmen for poisonous drugs and chemicals.



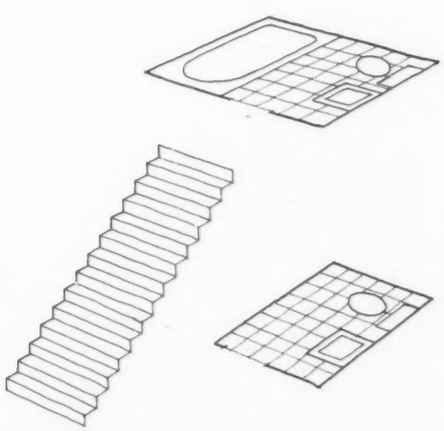
1. Locked and lighted compartment for drugs. 2. Razor blade slot. 3. Metal handles on fixtures. 4. Non-slip floor when wet. 5. Non-slip shower pan. 6. Flat bottomed tub. 7. Securely fixed metal grab bar. 8. Light switch at door.



HALLS should be well lighted, without steps or loose rugs; all doors should either slide horizontally or swing in. Many a hall could be easily illuminated by "borrowed" light



TWO PHONES in a two-story house are an investment in safety, reducing accidents caused by hasty efforts "to get downstairs before the phone stops ringing." Few stairs are designed for "fast traffic"



TWO BATHS in a two-story house are similarly an investment in safety (even more than in convenience) — especially where there are children or elderly people, for whom stair-climbing offers one of the greatest hazards

HOW SAFE IS THE KITCHEN

PERCENT OF ALL ACCIDENTS	17.8%
Falls	**32.8**
on stairs	.7
on floors	11.6
on rugs	1.6
on walks or ground	.3
from chairs, tables	10.1
from windows	1.7
from ladders or scaffolds	2.2
from fences	
from other outside elev.	.3
over objects	3.0
in or out of bed	.1
all others	1.2
Struck by flying, falling objects	**3.8**
Stepping on, striking against object	**8.0**
coll. with inanimate obj.	1.7
nail or splinter	1.3
needles, pointed objects	5.0
Handling, lifting, carrying	**3.4**
Burns, scalds, explosions	**26.8**
by gasoline, cleaners	4.3
by steam, hot liquids	14.4
all others	8.1
Asphyxiation, suffocation	**.9**
Firearms	**.9**
Poison (excl. poisonous gas)	**9.2**
by food	7.4
all others	1.8
Cut or scratch	**6.1**
Bitten by animals	**.7**
Foreign bodies	**2.3**
Hand caught in wringer	**1.7**
All others	**3.4**

Source: National Safety Council.

THE KITCHEN is the most dangerous single area in the house, not only to the housewife but also to children. Although the greatest danger comes from the use of fire and the presence of gas and hot liquids, falls, cuts, scratches and other types of accidents also occur in the kitchen. A great many kitchen accidents are the result of the hazards implicit in present customs of preparing, cooking and serving of food. (Frying in deep fat, for example, is the cause of many serious burns, while children are often scalded by overturning a boiling liquid on the stove.) Prevention of this category of accidents is largely a matter of education, rather than architecture. However, careful study by the architect can vastly reduce safety hazards in the kitchen.

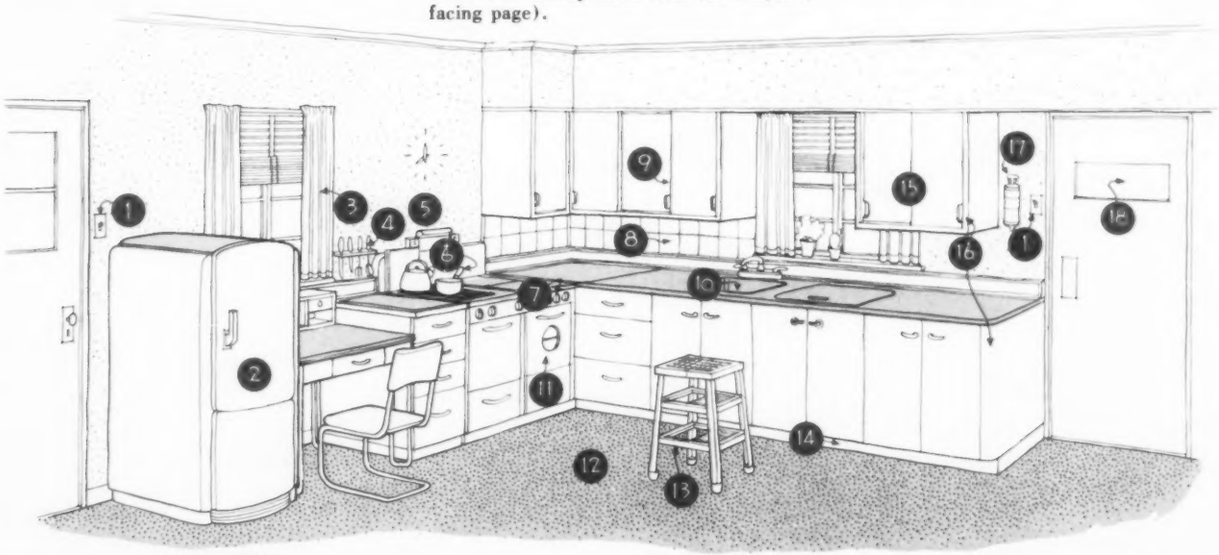
COOKING RANGES should always be located at least 1 ft. from window jambs. According to USHA, curtains blowing across range burners are a principal source of fires. By the same token, cupboards or shelving should not be located above ranges. Even when there is no danger of fire, the risk of falling against a burner while trying to get something out of the cupboard is great.

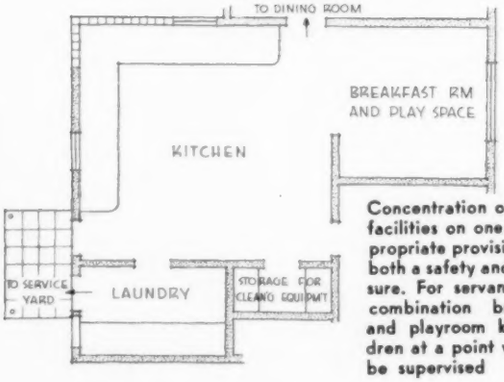
Ranges should conform to at least the minimum standards of the American Gas Association or the Underwriters' Laboratories. High ovens and very low ones constitute safety hazards which cause many serious burns. One alternative might be the use of separate cooking units, built into the cabinet work at optimum level (bottom, left, facing page).

STORAGE SPACE in the kitchen is a recognized necessity, since more equipment is required there than in any other area of the house. Moreover, this equipment is in relatively constant use, so that most storage space is "live." Ease of access to this "live" storage space is of paramount importance. Many bad falls result from it being too high, while lifting strains occur if it is too low; it should be concentrated in a horizontal zone from about 1 ft. off the floor to a little over eye level.

Such cabinets should have no exterior angles; where necessary, they should be rounded. Sliding doors are likely to be less hazardous than hinged ones. All handles and escutcheons should be of metal.

ADEQUATE LIGHTING both natural and artificial, is perhaps more important in the kitchen than elsewhere. Many types of kitchen accidents are directly traceable to poor lighting. Both general and local illumination are necessary, but well-lit working surfaces are especially desirable, since general lighting alone forces the housewife to work in her own shadow. Continuous backlighting of counters by means of glass or glass block panels, plus continuous downlighting from overhead cabinets, offers one solution (bottom, right, facing page). General lights should be controlled from switches at door. All light switches and fixtures should be out of reach of plumbing fixtures and refrigerator.





Concentration of housekeeping facilities on one level, with appropriate provisions for each, is both a safety and a health measure. For servantless houses, a combination breakfast room and playroom keeps the children at a point where they can be supervised

1. Light switches at all entrances. 2. Refrigerator and light switches far enough from sink so that simultaneous contact is impossible. 3. Range at least 1 ft. from window jamb so curtains can't burn. 4. Cutting knives stored in racks—not drawers. 5. Vent all combustion stoves to outside. 6. Keep all pan handles turned in. 7. Gas range petcocks should have safety clips. 8. Continuous lighting for counters. 9. Sliding cupboard doors to avoid bumped heads. 10. Garbage disposer or built-in garbage compartment with outside access. 11. Oven and broiler high enough to avoid stooping and lifting heavy hot objects. 12. Non-slip floors. 13. Breakfast-play room adjoining kitchen. 14. Toe recess. 15. Adequate shelving—not too high, not too low. 16. Avoid projecting cabinets; where necessary, round off corners. 17. Fire-extinguisher at door to rest of house. 18. Glass panel in double acting door to dining room.

HOW SAFE IS THE DINING ROOM

PERCENT OF ALL ACCIDENTS	3.0%
Falls	48.2
on stairs	
on floors	7.7
on rugs	7.0
on walks or ground	.7
from chairs, tables	9.0
from windows	8.4
from ladders or scaffolds	4.2
from fences	
from other outside elev.	1.4
over objects	4.2
in or out of bed	4.9
all others	.7
Struck by flying, falling objects	4.9
Stepping on, striking against object	10.5
coll. with inanimate obj.	2.1
nail or splinter	1.4
needles, pointed objects	7.0
Handling, lifting, carrying	2.1
Burns, scalds, explosions	11.2
by gasoline, cleaners	1.4
by steam, hot liquids	4.2
all others	5.6
Asphyxiation, suffocation	.7
Firearms	1.4
Poison (excl. poisonous gas)	8.4
by food	8.4
all others	
Cut or scratch	4.2
Bitten by animals	.7
Foreign bodies	4.2
Hand caught in wringer	
All others	3.5

Source: National Safety Council

Dining room in a large residence by Victor Civkin, Architect

LIKE THE BATH, the dining room is the scene of relatively fewer accidents than other areas. This is probably due to the fact that it is normally used only at meal times. Many of these accidents occur as the result of "unsafe practices" (children pulling table cloths off a loaded table, people leaning back in fragile chairs, housewives getting badly burned on the waffle iron). Against accidents of this type, the architect can obviously do little.

ADEQUATE CHINA STORAGE — either in the dining room or between it and kitchen — is an essential. Like the kitchen, the equipment here is in daily use; this implies "live storage" without stooping or reaching.

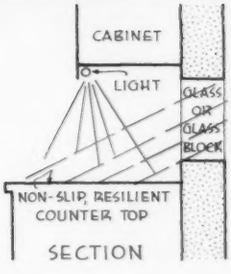
Another portion of dining room accidents are due to the room's being used for purposes other than that of eating—i.e., sleeping, children's playing, sewing, etc. This is inevitable in a small house where space is at a premium and sheer pressure forces the improper use of the dining room. Hence the design of dining rooms might well provide for combination use by flexible layout and adequate storage space.

Padilla Studios

This kitchen, designed by J. R. Davidson, features a series of cooking units (instead of a stove) so organized as to prevent stooping or reaching

Insulux Div., Owens-Illinois Glass Co.

Counter space, well-lighted day and night, is the best prevention of many of the cuts and burns which occur in the kitchen



HOW SAFE IS THE LIVING ROOM

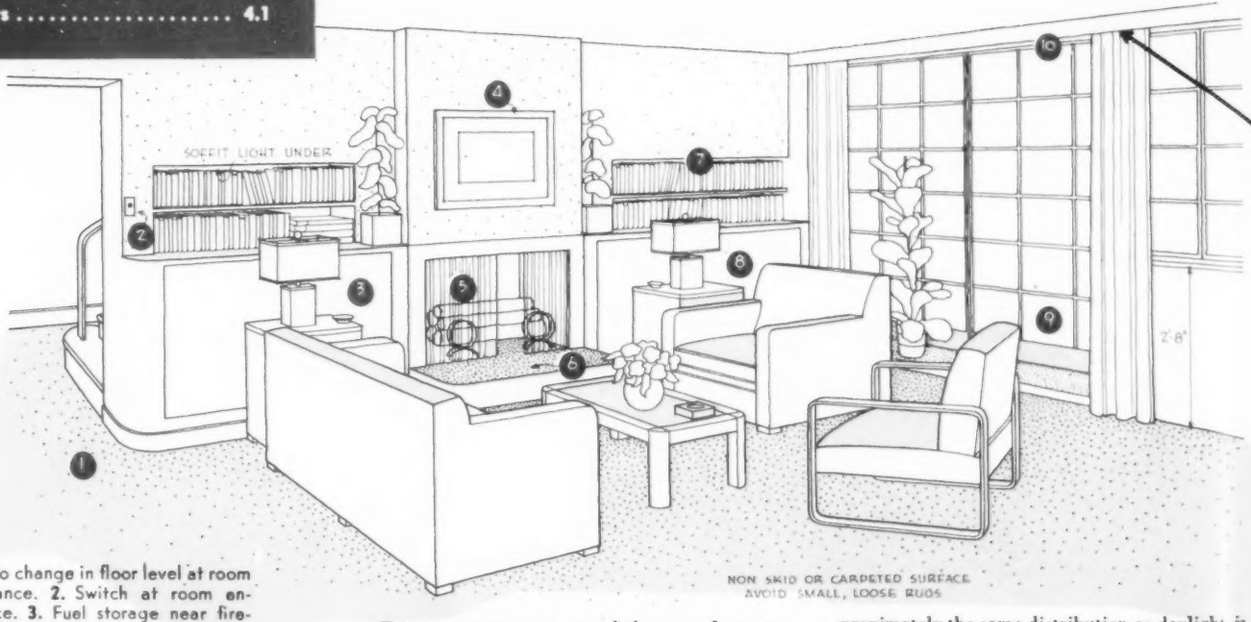
PERCENT OF ALL ACCIDENTS	8.4%
Falls	**57.8**
on stairs	.8
on floors	9.9
on rugs	9.2
on walks or ground	.3
from chairs, tables	13.7
from windows	10.5
from ladders or scaffolds	6.6
from fences	
from other outside elev.	.5
over objects	3.3
in or out of bed	1.5
all others	1.5
Struck by flying, falling objects	**4.8**
Stepping on, striking against object	**12.0**
coll. with inanimate obj.	1.5
nail or splinter	1.5
needles, pointed objects	9.0
Handling, lifting, carrying	**3.1**
Burns, scalds, explosions	**5.9**
by gasoline, cleaners	.5
by steam, hot liquids	1.0
all others	4.4
Asphyxiation, suffocation	**1.3**
Firearms	**1.5**
Poison (excl. poisonous gas)	**.4**
by food	.2
all others	.2
Cut or scratch	**2.5**
Bitten by animals	**.5**
Foreign bodies	**6.1**
Hand caught in wringer	
All others	**4.1**

Source: National Safety Council.

Illuminated soffit gives general illumination of room at night same general direction and distribution as in daytime

Westinghouse

These bookshelves are located for easy visibilty and access in the optimum storage zone



1. No change in floor level at room entrance. 2. Switch at room entrance. 3. Fuel storage near fireplace. 4. Adequate provisions for hanging pictures. 5. Flush, adequate fire screen. 6. Raised hearth —safer and easier to clean. 7. Bookcases at or near eye level. 8. Storage for special equipment — toys, card tables, etc. 9. All large areas of fixed glass should be protected by low platform or rail. All regular windows should be 2 ft. 8 in. off floor. 10. Adequate special and general lighting: Light sources similar day and night.

THOUGH THERE ARE recorded cases of persons having been killed in living rooms by heavy picture frames falling off the wall, the majority of accidents are again caused by falls, and stepping on or striking against inanimate objects. Desirable safety measures are consequently similar—good lighting, non-skid floors, design of room and layout of furniture for multiple use and easy circulation. As in the dining room, many of these accidents are due to the varied and often conflicting activities which take place here—playing, sewing, studying, dancing, sleeping, etc. Since, especially in the small house, this is the only area in which such activities *can* occur, it is essential that they be anticipated and provided for.

GOOD GENERAL ILLUMINATION, with approximately the same distribution as daylight, is generally desirable. Localized lighting for reading, writing, etc., is of course essential. Ordinary windows should be at least 32 in. off the floor (unless protected), should be easily cleaned from the inside, and securely screened. Where glass areas extend to the floor, they should be protected by low rail or platform, unless they also serve as doors to porch or terraces; in which case changes in level should be held to a minimum.

FLOORS should not be too highly polished. Avoid small rugs unless mounted on rubber "grippers" to prevent sliding.

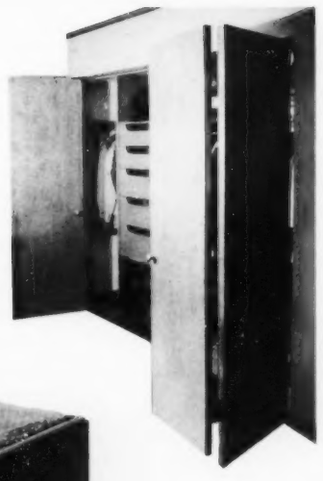
FURNITURE should be organized for easy movement through room to reduce hazard of "colliding with inanimate objects."

HOW SAFE IS THE BEDROOM

PERCENT OF ALL ACCIDENTS	7.0%
Falls	**48.6**
on stairs	.6
on floors	7.0
on rugs	2.4
on walks or ground	
from chairs, tables	1.8
from windows	8.8
from ladders or scaffolds	3.7
from fences	
from other outside elev.	.3
over objects	2.7
in or out of bed	18.6
all others	2.7
Struck by flying, falling objects	**3.7**
Stepping on, striking against object	**7.3**
coll. with inanimate obj.	2.7
nail or splinter	.6
needles, pointed objects	4.0
Handling, lifting, carrying	**3.3**
Burns, scalds, explosions	**10.9**
by gasoline, cleaners	1.5
by steam, hot liquids	1.5
all others	7.9
Asphyxiation, suffocation	**2.4**
Firearms	**2.7**
Poison (excl. poisonous gas)	**3.7**
by food	1.0
all others	2.7
Cut or scratch	**1.5**
Bitten by animals	**1.0**
Foreign bodies	**3.7**
Hand caught in wringer	
All others	**11.2**

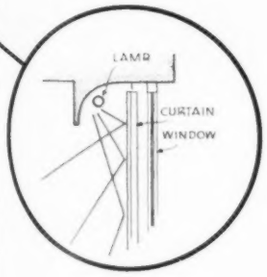
Source: National Safety Council.

General Electric



Benton Building Co.

Adequate storage space (above) accessible without reaching or bending. Built-in local lighting for reading in bed (left)



1. Windows washable from inside; at least 32 in. above floor. 2. Well secured screens. 3. Adequate storage; suits, dresses and shoes at eye level. 4. Permanent local lighting. 5. Switch at room entrance, controlling general lighting. 6. Door opens into bedroom, not too near stair head.

BEDROOMS are the scene of many types of accidents of which, ironically, "falling in or out of bed" is one of the most common. Many cases involve children — suffocation by bed clothes, poisoning from eating paint off furniture or woodwork, cuts or scratches from razor blades or needles dropped in the wastebasket.

OTHER CAUSES of many serious injuries and deaths in the bedroom are fire and smoke. The two-story house should have a fire-extinguisher in hall within easy reach of all bedrooms. If fire alarms are included they might well ring in each bedroom.

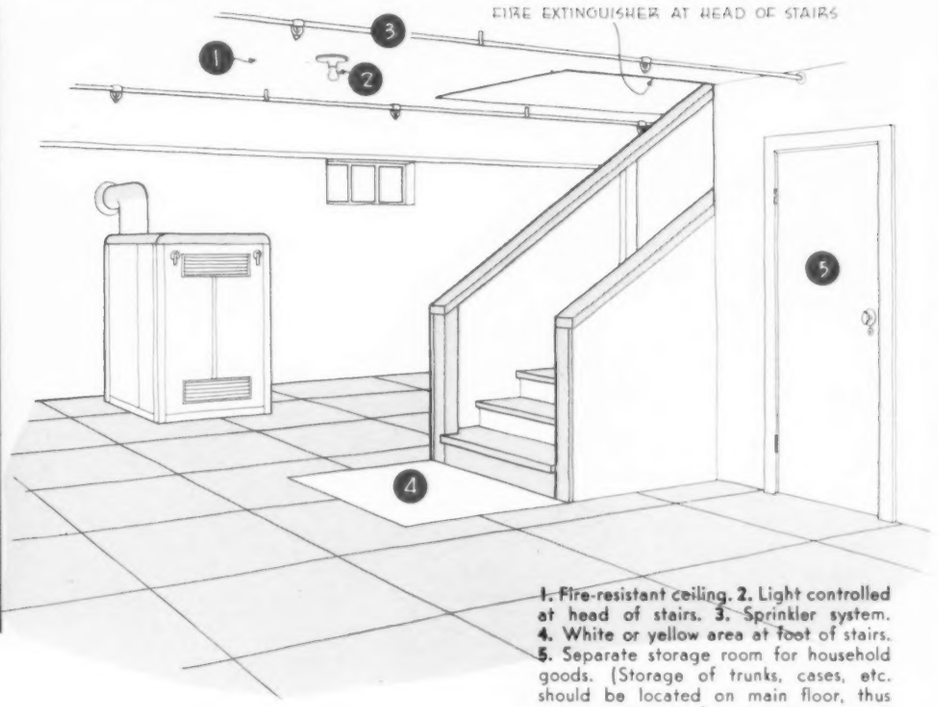
WINDOWS in bedrooms — especially second floor bedrooms—should be 32 in. off floor, securely screened and easily cleaned from inside.

NEED FOR adequate lighting, safe non-slip floors, and efficient organization of furniture is as great—if not more so—here as elsewhere in the house.

HOW SAFE IS THE BASEMENT

PERCENT OF ALL ACCIDENTS 5.7%	
Falls	**25.8**
on stairs	3.8
on floors	9.5
on rugs	.4
from chairs, tables	1.5
from windows	1.1
from ladders or scaffolds	1.5
from other outside elev.	1.1
over objects	5.0
in or out of bed	.4
all others	1.5
Struck by flying, falling objects	**10.7**
Stepping on, striking against object	**12.2**
coll. with inanimate obj.	1.9
nail or splinter	4.2
needles, pointed objects	6.1
Handling, lifting, carrying	**15.6**
Burns, scalds, explosions	**9.2**
by gasoline, cleaners	2.3
by steam, hot liquids	2.3
all others	4.6
Firearms	**.8**
Cut or scratch	**9.2**
Bitten by animals	**.4**
Hand caught in wringer	**13.4**
All others	**2.7**

Source: National Safety Council.



1. Fire-resistant ceiling. 2. Light controlled at head of stairs. 3. Sprinkler system. 4. White or yellow area at foot of stairs. 5. Separate storage room for household goods. (Storage of trunks, cases, etc. should be located on main floor, thus reducing danger of sprains, hernia, etc.)

THERE ARE CERTAIN safety factors which cut across the entire house and must consequently be handled as *systems* rather than as isolated factors which occur in each room.

FIRE PROTECTION. The best house is naturally one which is literally non-inflammable. But such construction is beyond the reach of the majority of clients; and there is the added fact that most household furnishings and equipment are highly inflammable, so that disastrous fires can occur in houses which are structurally non-inflammable. Thus the most economic measures are usually the fireproofing or fire-retarding of vulnerable areas such as roof, furnace-room and kitchen. Domestic sprinkler systems and fire alarms are two features which could economically be included in most houses, with little increase in cost and great increase in safety. The absolute minimum in a non-fireproofed house should be fire extinguishers in kitchen and/or furnace room. If the house is two-storied, there should be an additional extinguisher on the second floor, since open stairs offer a natural flue for spreading flames. In general, fire-prevention measures may be grouped under these heads: 1. fireproofing of entire structure; 2. fire resistance of vulnerable areas; 3. sprinkler systems; 4. fire alarms; 5. fire extinguishers.*

ADEQUATE DAY AND ARTIFICIAL LIGHTING. In the last analysis, it may be said that inadequate lighting is the principal cause of accidents, since even hazardous conditions can be avoided if well-lighted. Where possible, both day and artificial lighting should conform to accepted standards for specific seeing tasks. Of great importance is continuity *in time* (minimum variation from day to night) and *in space* (minimum variation from room to room).**

STORAGE. Adequate storage space — carefully designed for a specific purpose — is much more a problem of *safety* than of mere convenience. The majority of falls are the result of either (1) an attempt to get or replace an article in storage or (2) falling over or colliding with an article which should have been stored but wasn't because of lack of proper storage facilities. Zones of active storage (i.e., articles in constant use) should be designed so that no reaching or climbing, resulting in strains or falls, is necessary. Zones of inactive storage (i.e., articles in seldom or seasonal use) should be on main floor wherever possible.

TRAFFIC. Architects as a rule devote a good deal of attention to "circulation": yet this is too often approached as simply a matter of plan, rather than one involving non-slip surfaces, easy turns, good illumination, minimum changes in level, etc.

SPECIAL PROVISIONS FOR THE VERY YOUNG, THE AGED AND THE INFIRM. As indicated in charts on page 68, even the best house is hard on the very young or the aged user. Since these age groups are in the minority in the average family, and since even this minority changes with time, it is seldom possible to make optimum provisions for them. However, a careful study of the house from the standpoint of their special needs can do much to eliminate hazards to their health and safety.

*See AR, 10/40, pp. 81-83, for specific fire protection measures.
**For extended discussion of this problem, see AR, 12/40, pp. 49-55, and 4/41, pp. 69-76.

WINDOW DESIGN AND SELECTION

By RONALD ALLWORK

MANUFACTURING TRENDS

RAPID industrial and technological advances have affected the window industry as they have other manufacturers. But the manufacturer whose product has sold well may need a special stimulus to enable him to see the potential value of improvements in existing products and advances in design. These stimuli have come notably from competition within the industry, development of new materials and techniques, new types of building services (air conditioning, for example), demands of building designers for windows which function more satisfactorily.

Within the industry, competition has produced almost unbelievable results. Industrial production demands specialized attention to each step of fabrication; to sell in today's markets, the product has to be uniformly well constructed; so good construction is today a commonplace.

The advent of metal, new to the industry several years ago, had in particular a tremendous impact. Use of metal sash demanded use of metal frames; in time, the "packaged window," pre-fitted to a frame, became common in wood as well. This, along with greater precision in manufacture and hence more continuously satisfactory use, offers time savings in installation. Out of such beginnings have come substantial efforts at standardization. Wood and metal window trade associations, governmental requirements, and the simple necessity of limiting products to a competitively practical range, have aided the process.

For the architect, this means that, within certain limits, the draftsman and specification-writer can select a stock design to suit particular needs without limiting competition. As currently isolated examples of window units multiply, the architect, builder and owner stand increased chances of getting cheaper and better buildings.

But regional preference, climate, orientation, direction of winds, type of interior curtail development of scientific standards for sizes, glass areas, etc. Building code regulations for minimum sizes are concerned primarily with ventilation—which is only one function. And though industry-imposed rules may govern tolerances between frame and sash, some manufacturers pare down the sash, some enlarge the frame. So at present it seems preferable to order sash and frame from one manufacturer.

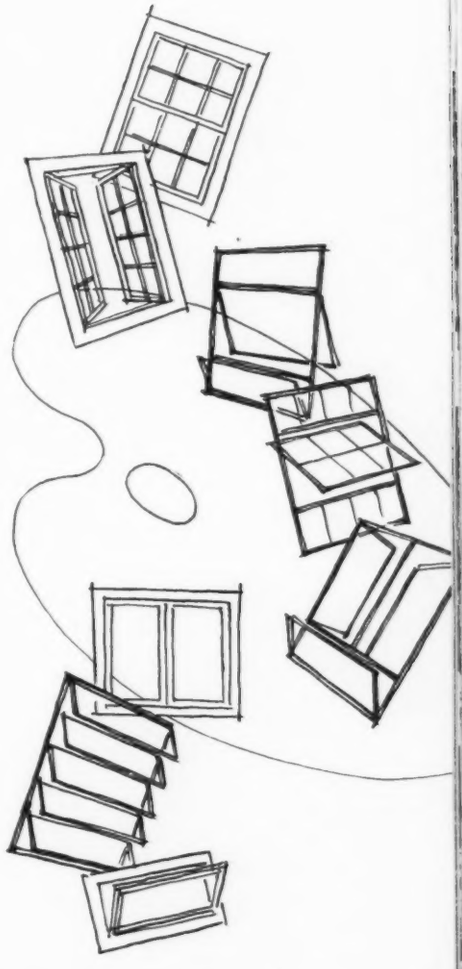
Development of new materials and techniques has likewise opened up tremendous possibilities—in design, for the architect, in sales, for the manufacturer. Chief of these is probably the application to all kinds of buildings of the principle of frame construction and curtain walls. Even the brick residence is now most often a frame with a masonry veneer. And the curtain wall can be a series of windows as well as wood or metal, masonry or glass block. Thus the area usable for windows has been substantially increased.

It is further enlarged as the strength of materials for supporting framing is increased or made more readily available; as engineering principles—truss, cantilever, etc.—are applied to permit wider use of long horizontal windows, tall vertical ones, corner windows, bays, and a great variety of architecturally free forms.

New services. Of these, air conditioning seems to be causing the greatest changes in window design. Differences in indoor and outdoor temperature and humidity cause condensation. Long troublesome, this phenomenon is combatted by double glazing. A few years ago, windows could be equipped with storm sash at extra expense. Today, rare is the manufacturer who does not offer integral double glazing, or windows designed to permit its easy installation. And the cumbersome storm sash is most often replaced by a simple sub-frame which the housewife moves easily for cleaning.

As to cleaning: demountable or tilting sash, extension hinges, larger glass areas, simpler mouldings—all these reduce hazards and increase cleaning ease.

A keener appreciation of health hazards and demands for greater comfort, plus intra-industry competition, have made available durable screens in sturdy, demountable or movable units, and window operators which penetrate the screen or its surrounding frame.



The wide range of types and sizes available in wood and metal windows offers the designer almost unlimited choice

WINDOW DESIGN AND SELECTION (continued)

THE DESIGNERS' DEMANDS

Primarily, a window must admit light and air; but both have to be controlled. Secondarily, a window has to distribute light, to permit a controlled degree of vision, to exclude inclement weather, reduce heat loss, air infiltration and condensation. Some available means of answering these demands are apparent from the foregoing.

Light and vision have to be considered concurrently in some respects. At present, quantity and distribution of light are usually controlled by appendages to the window —awnings, shutters, shades, venetian blinds—or by obscure glazing, which interferes with vision. Occasionally this latter is no drawback; for instance, in some factories.

Three alternatives seem practical. One is to design the entire building shell with control of light in mind. Examples include the Brazilian Press Building in Rio de Janeiro,* whose entire exterior wall is a series of louvers, oriented to exclude the tropic sun yet admit adequate light; and in numerous schools in our own far West vertical fin walls and horizontal canopies, sometimes louvered, exclude the noon sun while admitting sun at other times.

Another consists in use of glazing materials which distribute light to reflecting surfaces (mostly ceilings). "Distributing areas" of glazing might conceivably be combined with "vision areas" of clear glazing. Materials available include prismatic and pebbled glass, and plastics. It would seem that principles applied to prismatic lenses for lighting fixtures, which bend rays in almost any desired direction, might also be applied to window glazing.

The third method involves application of a number of standard practices and materials in combination. In one type of stock window, standard roller shades run in tracks on tilting sash, producing a sort of awning when the sash is pivoted horizontally. Another employs translucent slat shades as an integral part of the sash. One type of screen has fixed flat transverse wires which act as slat blinds.

Air has also to be controlled in quantity and direction. Degree to which sash opens controls only the quantity admitted; and in large windows the proportion of fixed to movable sash (particularly in metal casements) seems to be increasing. This may be due partly to decreasing size of structural members and consequent greater need for immobility, partly to the designer's desire for windows easier to curtain, partly to general recognition of the fact that, once a certain percentage of window area is open, not much more "air" is gained by opening the remainder.

Direction can be controlled by installing "ventilators," which guide incoming air to ceiling. Hinged or pivoted sash may take advantage of prevailing winds.

Air infiltration can be eliminated by proper installation. Most manufacturers offer standard details to achieve this result.

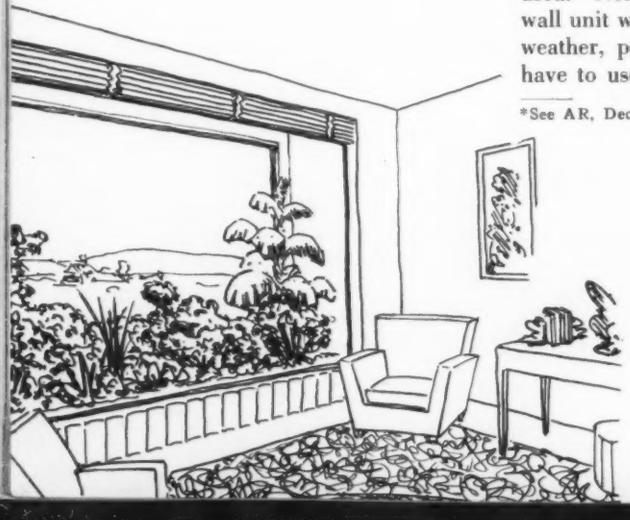
Heat loss can be combatted mechanically by weatherstripping, by using any "prefitted" window, and by double glazing. One refinement on the latter consists of sash with sealed double glazing; the air space is dehydrated and partially evacuated. This problem is probably most apparent because heat loss causes rising fuel bills.

Heat gain is more difficult. Some instances of use of large glass areas, to heat houses by solar rays, are extant. Complete shading seems the most practical means of excluding heat, but interferes with vision. Certain types of glass reflect heat rays away from human-level portions of the interior; others absorb some solar heat.

Weather exclusion is also achieved by weatherstripping. Rain and snow must be excluded when sash is open; some awning-type windows serve this purpose.

Alden Dow used a plastic cornice in Midland, Mich., to admit light, and open, screened eaves admitted air. Vision was, of course, excluded. Glass block has been used. None of these serve all functions of a window at once. Until we achieve a wall unit which will give light and air when, where and as we want it, which excludes weather, permits adequate vision, eliminates condensation and mosquitoes, we will have to use what we have—and the range is wide enough to satisfy most demands.

*See AR, Dec. 1940, p. 74.



There's no reason why stock window units cannot be used in a house to form a double glass wall, with planting space between

WINDOWS—1

METAL FRAMES and SASH

ARCHITECTURAL RECORD TIME-SAVER STANDARDS
MAY 1941

Information on these sheets was collected and prepared by Ronald Allwork. Sources include the Metal Window Institute; R. L. Clingerman, Engineer; and numerous manufacturers of metal windows.

Stock metal windows, of the types most commonly used, are described on the following pages. They are available in a number of metals and alloys; those most widely accepted are steel, bronze, and aluminum.

Standardization of metal windows, particularly as to type, construction, and quality of materials, has been established to a degree. Sizes, however, have not been completely standardized. Some progress has been made in this respect as regards glass sizes, number of lights, etc. For overall dimensions, or rough opening requirements, the designer is referred to the various manufacturers.

Bronze windows are available in both casement and doublehung types.

Aluminum windows are made in both casement and doublehung types, usually of extruded sections with riveted or welded joints.

Steel windows are divided into three general product groups: industrial, casement, and doublehung. Industrial and casement types are made from special rolled-steel shapes, while doublehung types are fabricated from sheet steel of various gauges. These may be further divided into four sub-groups of heavy, intermediate, light steel and hollow metal. The corresponding general gauges prevailing in each sub-group are roughly 12, 14, 18 and 24.

The essential difference between industrial and casement windows lies in design of steel sections used, and in construction details of frames. In casement sections, contact surfaces of ventilator frame to window frame are flat and parallel. In industrial windows contact is made between the flat surface of one section and the edge of another. The casement type, therefore, offers a more weather-tight window due to the fact that the distance between the contact surfaces of the sections is definitely and accurately controlled in the rolling of the shape, and any slight excess or discrepancy in the metal occurs in the end of the legs, which are not themselves in contact.

Another point of difference is that the corners of all casement ventilators and frames are solidly welded, while for industrial windows it is more common practice to rivet all mechanical joints, with possibly a tack weld to provide greater security.

Industrial frame sections are also provided with an outside leg of sufficient length to permit installation directly in masonry; although casement windows may also be so equipped, casements are more often set in masonry rebates, or in sub-frames. When window frames are set directly in masonry (other than cut stone) a continuous fin is usually attached to provide proper anchorage.

Protection against corrosion should be provided for in all windows. Some metals come by this naturally. Bronze and aluminum are commonly considered to possess this characteristic because under usual conditions a protective film is formed on the exposed surfaces of the metal (through a process of corrosion) which retards further breaking down of the metal.

Because no such protective film is formed on steel, painting is the most widely accepted method of protection. To be successful, however, it is essential that the surface of the metal be properly prepared. This is best accomplished by: (1) removing all mill scale by shot or sand blasting (or a similar process), or by pickling; and by (2) providing a protective surface film on the metal prior to painting. Such a film may be of iron phosphate, which is resistant to corrosion and forms the basis for such well-known processes as Bonderizing and Parkerizing. The films formed by these processes, while not sufficient to protect the metal entirely by themselves, provide an excellent base for paint. Finally, the paint selected should tend to prevent the steel from rusting through the process of chemical action on its surface, rather than only by retarding moisture and oxygen penetration.

Installations of metal windows should further insure against corrosion at the point of setting, particularly where steel is imbedded in concrete or any porous material subject to moisture penetration. This is sometimes provided for by painting with asphaltum or similar preparation, by setting the frame on wood strips, by caulking, or by applying a bituminous coated fabric to all surfaces contacting the masonry. Where adequate precaution is not observed, rust may occur; and metal expanded by rust may cause distorting of the frame, spalling of the masonry, breakage of glass, and leaks.

Hardware, except for special items, is regularly furnished with metal windows, and is of a design, quality and metal appropriate to the type of frame.

Casement ventilators (side-hinged) may be equipped with a lever handle and suitable friction arrangement for holding the window open, or a roto-operator designed to control sash through or below a stationary screen.

Weather stripping, applied at factory, is generally obtainable in metal windows of the casement and doublehung types, although on some types it is considered an extra.

Screens are available for most window types and are fitted, on order, at the factory. Roll, sliding, and hinged screens are available. Winter windows are designed to be used in place of screens.

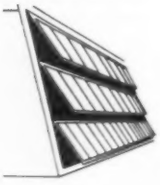
Other items such as shade and drapery bracket holes may be specified. Steel sills, radiator brackets, grilles, spandrels, trim, etc., are also obtainable; integral double glazing is also available.

CHECK

- Type of window
- Type of ventilator (pivoted, projected or hinged)
- Size and location of ventilator
- Swing of ventilator (in or out, from side, top, or bottom)
- Location of horizontal mullions
- Detail of wall at point of window attachment
- Mastic and caulking
- Hardware
- Glass thickness
- Location of shade and drapery bracket holes
- Steel stoves, sub-frames, radiator brackets, grilles, spandrels, trim, screens, winter windows

WINDOWS—1

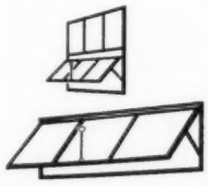
METAL FRAMES and SASH

TYPE	USE	DESCRIPTION
PIVOTED 	For industrial buildings, garages, etc., and for boiler rooms in all types of buildings.	"Industrial" construction. Joints of abutting members are usually tenoned and riveted. Windows are designed for interior glazing. Ventilators swing out at bottom and in at top, and are not readily adaptable for screening. Mechanical operators are available for opening and closing banks of windows in unison.
COMMERCIAL PROJECTED 	Adapted to same uses as pivoted windows.	Similar in construction and quality of materials to pivoted windows, but method of ventilator operation affords more positive and convenient control, and facilitates screening, shading, etc. Windows are designed for interior glazing. This type of window is not readily adaptable to mechanical operation.
ARCHITECTURAL PROJECTED 	Suitable for schools, institutional buildings, offices, etc. Is often combined with *Pivoted* or *Commercial Projected Windows* on industrial projects when a better window is desired for the more important openings, such as those in the office portion.	Although made of the same "Industrial" sections employed in Pivoted Windows, Architectural Projected Windows are superior in construction; all corners are welded and sash have bronze hardware. Glazing may be either interior or exterior. Interior glazing is bedded in putty and secured by metal sections, coped or mitred at corners.
CONTINUOUS 	For monitors or saw-tooth roof construction.	Continuous windows are of heavy construction, are hinged at the top, and provide suitable ventilation plus full protection during inclement weather. They are available in standard heights of 3, 4, 5, or 6 ft., with length of runs made to suit individual job requirements. Usually controlled by mechanical operators, either manually or electrically operated. Glazing is exterior. Wire glass, not less than ¼-in. thick, is most commonly used.
DETENTION Protection Design 	Protection windows are intended for moderate protection of openings in retail stores, warehouses, factories, tool rooms and offices in all types of commercial and industrial buildings.	*Protection windows* consist of a grilled main frame with muntins continuous from head to sill and from jamb to jamb, and a ventilating unit (or units) made up of a ventilator and an auxiliary frame superimposed on the inner face of the grille. Glass sizes of grille lights do not exceed 88 sq. in. Glazing is interior or exterior depending on requirements.
	Security windows are intended for moderate protection against forced entry.	Identical with *Protection Windows* in materials and construction except that glass size is considerably larger: 5-13/16 x 18 in. (nominal). Windows are interior glazed.
Industrial 	Industrial Detention: Intended primarily for moderate protection against exit in institutions for psychopathic patients.	Identical in materials and construction with Pivoted or Commercial Projected Windows. Glass lights do not exceed 160 sq. in. in area. Ventilators are not higher than 16 in. and usually project in at top.
	Guard: Intended for protection against forced exit in penal institutions.	Design of muntins and ventilator similar to Protection Design. Glass lights do not exceed 108 sq. in. in area and are applied from the exterior.

WINDOWS — 2

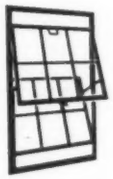
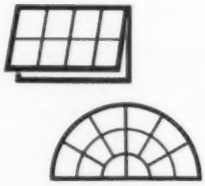
METAL FRAMES and SASH

ARCHITECTURAL RECORD TIME-SAVER STANDARDS
MAY 1941

TYPE	USE	DESCRIPTION
CASEMENT 	For homes, apartments, dormitories, offices, institutions and other types of buildings.	Casement windows are made in several weights to meet various service requirements. Weather-stripping, screens, winter windows, etc., may be had with this type. Casements may also be obtained with wood surrounds installed at factory and shipped ready for erection.
PROJECTED CASEMENT 	For all types of buildings where high quality is desired; particularly hospitals, schools, offices, etc., because of the convenient method of controlling natural ventilation.	Similar in quality of materials and construction to casement windows. Ventilator opens by either projecting out at bottom as top slides down or projecting in at top as bottom slides up.
COMBINATION CASEMENTS 	For same types of buildings as *Projected Casements.*	Similar to projected casement in quality of materials and construction, and differs only in that it offers a combination of side-hinged and projected ventilators.
AWNING 	Suitable for schools, hospitals, auditoriums, gymnasiums, armories, power houses, public buildings.	Ventilators operate in unison, either by manual control or by concealed mechanical operators, as desired. Fully opened, windows provide approximately 100% ventilation.
LOUVER 	Same as for awning type, and also suitable for residences. May be used as a detention window for buildings housing psychopathic patients.	Similar to awning windows in that louvers operate simultaneously, but is of much lighter design. Louvers may be had as small as 5 in. high. Operating mechanism is concealed and controlled by hand crank.
BASEMENT AND UTILITY 	Suitable for basements (residences, apartments, dormitories, barracks, camps, etc.) and barns and other farm buildings.	Construction and materials similar to pivoted windows. Ventilators for basement windows usually are hinged at bottom and open inward. Ventilators for utility windows may be hinged or projected to open inward at top or outward at bottom. Glazing is generally from interior.

WINDOWS — 2

METAL FRAMES and SASH

TYPE	USE	DESCRIPTION
AUSTRAL 	For schools, hospitals, institutions, public buildings, where good ventilating and shading are required.	Upper and lower sash are counterbalanced on arms pivoted to the frame. Balance arms are free to revolve through a quarter circle; upper and lower sash operate simultaneously and balance each other.
DOUBLEHUNG 	For all types of buildings where high quality is desired.	Doublehung windows are made in several weights to meet various service requirements. Also made in Kalamein. Weather-stripping generally (though not always) provided as standard. A number of types of balances are offered with these windows.
DOUBLEHUNG with Ventilator 	Same as doublehung, but particularly suitable for hospitals, and office buildings.	Similar to doublehung in all features; in addition, has an inprojecting ventilator.
DOUBLEHUNG Detention 	For hospitals, sanitariums, and other institutions for mental patients.	Similar to Security type in muntin design. Top sash is fixed. Grille extends from bottom of top sash to sill and is usually hinged for cleaning. It is secured by lock. Bottom sash is operated by spring balances.
REVERSIBLE 	For homes, apartments, dormitories, offices and all buildings where good ventilation and easy cleaning are important.	Made in two types. Doublehung reversible window retains all doublehung window features and in addition permits sash to be tilted for ventilation or reversed for cleaning. The second type does not slide up and down; sash are openable only by means of the tilting feature.
TRANSOMS, CIRCLE HEADS 	Used in conjunction with casement windows or separately as decorative sash.	Construction similar to casement windows; available in a number of special shapes.

WINDOWS — 3

WOOD FRAMES and SASH

ARCHITECTURAL RECORD
TIME-SAVER STANDARDS
MAY 1941

Information on this sheet was collected and prepared by Ronald Allwork. Sources include the National Door Manufacturers' Association and various manufacturers of wood windows.

Types of stock wood windows are described overleaf. They are adaptable to all forms of construction. Pine is the material most widely used, but stock windows can be had in other woods as well. It is possible to obtain windows in almost any desired shape or muntin arrangement at reasonable cost.

Standards for manufacturing stock window frames and sash have been set up by the manufacturers' association and are rigidly followed. These standards, particularly as applied to doublehung windows, vary according to locale and embody differences established by common practice in various sections of the country. Within a particular geographical market, therefore, while such items as sizes of stiles and rails may vary slightly with different manufacturers, the finished opening or overall size of a window is essentially the same for similar products.

Many manufacturers offer certain types as complete units only, both window and frame being factory-fitted. However, it sometimes happens with doublehung windows especially, that frames are obtained from one manufacturer and sash from another. This practice may lead to unsatisfactory results. For example, some manufacturers provide clearance between sash and runway by making sash slightly undersize; others make their sash full thickness and runways a trifle oversize. Thus it is quite possible to have a combination of sash and frame which results in a window either too loose or too tight.

Dimensions. Thickness is usually 1⅛, 1⅜ or 1¾ in., with a "thickness tolerance" not exceeding 1/16 inch less than the nominal thickness being allowed. Sash can also be made ¾, 2¼ and 2½ in. thick.

Sash are generally either mortised-and-tenoned or slot-mortised. In frames for masonry walls, sills are customarily rebated to receive jambs, while in frames for frame construction, jambs are rebated to receive sills. Mouldings (or "sticking") are either ogee or ovolo in design, depending on the manufacturer.

Toxic preservation treatment is offered by many manufacturers as a means of protecting the wood against decay resulting from fungus growths and other organisms. Treatment consists of dipping the frame and sash members in a toxic oil developed by the association, in accordance with standard specifications.

Screens and storm windows are readily applied to most standard sash. There are available stock designs which incorporate double glazing as an integral part of the sash, or which are designed for an easily-applied extra glazing unit in its own frame. Special rebates are not necessary. All types of screens—stationary, hinged, sliding, roll, etc., are adaptable.

Hardware is not usually furnished with windows; common practice is to specify it separately and install it on the job.

Casement windows (side-hinged) may be equipped with either a lever handle and suitable friction arm, or a roto-operator designed to control the opening or closing of the ventilator through or below a stationary screen.

Doublehung windows may be equipped with any one of a number of types of sash balances, such as typical sash weights, special (flat) sash weights, spiral balances, spring balances.

Weather-stripping may be factory-applied, or applied at a later date. Its cost is usually extra.

Installation. Some manufacturers recommend that installation of sash be delayed until trim is applied within the building. In this case, openings can be closed with storm windows, or with muslin-covered frames, etc.

One manufacturer recommends that a stout spreader piece be inserted in the frame at the check-rail line to prevent bulging due to moisture released by wet plaster; and that sash be not installed until plaster is thoroughly dry.

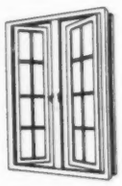
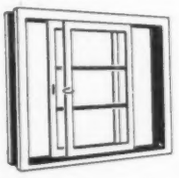
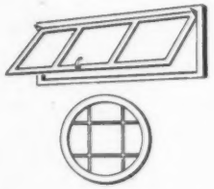
Packaged windows, precision-fitted at the factory, complete with frame, sash, weather-stripping, screen, storm window, etc., are offered by many manufacturers. These are shipped either knocked-down or completely erected.

CHECK

Type of window
Thickness of sash
Number of lights
Type of sash balance
Quality of lumber
Wall construction and dimensions
Swing of casement
Priming or preservative treatment
Hardware
Glazing
Weather-stripping
Storm windows
Screens
Flashing

WINDOWS — 3

WOOD FRAMES and SASH

TYPE	USE	DESCRIPTION
DOUBLEHUNG WINDOWS 	For all types of buildings.	Most widely used of wood types, this window is available in a variety of weights and sizes. It is also regularly made to accommodate the different kinds of sash balances, such as weight, spring and spiral types.
CASEMENT WINDOWS 	For residences, apartments, etc.	Casements are regularly made with either inswinging or outswinging sash. With inswinging casements, screens do not have to be opened to operate sash. Outswinging casements may be equipped with crank operators which obviate the necessity of opening screen. Details should be inspected to insure watertightness.
REVERSIBLE WINDOWS 	For hospitals, apartments, offices, and all buildings where good ventilation and ease of cleaning are important.	Available in two types: *doublehung* reversible windows which retain all the features of the regular doublehung window also permit the sash to be tilted for ventilation or reversed for cleaning; and a second type which does not slide up and down—sash are opened only by means of the tilting feature.
AUSTRAL TYPE 	For schools, hospitals, institutions, public buildings, where good ventilation and shading are required.	Upper and lower sash are counter-balanced on arms pivoted to the frame. Balance arms are free to revolve through a quarter circle, the upper and lower sash operating simultaneously and balancing each other.
SLIDING WINDOWS 	Suitable for residences, camps, bungalows, barracks, and other structures.	Available in two types. In first, one half of sash slides in back of other half, which is fixed; in the second type operation is similar except that both sash slide, and when closed, both sash are in same plane.
BASEMENT AND SPECIAL SASH 	Basement windows are suitable for basements, cellars, and in the larger sizes, for barracks, camps, etc. Special or ornamental types are available for various purposes.	Basement windows are constructed similarly to casement type, and have hinged sash. Ornamental windows, such as quadrant, elliptical, bull's-eye design, are available.

Planned

LARGE-SCALE HOUSING

A BALANCE SHEET OF PROGRESS

by CATHERINE BAUER . . . "Large-scale housing" is an abstract idolum that trips lightly off the tongue of every technician, architect and economist. What do they mean by it? What can we expect of it? Do we really want it, and if so are we achieving it? If not, why not?

Photo by Fairchild Aerial Surveys, Inc.

THE HOUSERS' CREDO

***THE ESSENTIAL FACTS** underlying the housing problem are already clichés and probably even Mr. Arbuthnot would put them about as follows:*

- **We have slums, which hurt health and morale, waste taxes;**
- **We also have millions of not-so-good homes, including many brand new ones, rapidly dragging huge areas into blight and tax-delinquency;**
- **And we are about 2½ million dwellings short (NRPB), quite apart from replacement of bad homes, and defense crises.**
- **Something is wrong with the residential building industry—its instability undermines our economic welfare;**
- **Something is wrong with the private home market—it's still a luxury trade by and large serving only the top third income group;**
- **Something is wrong with residential building costs first and last—a house costs more while other things cost less;**
- **Something is wrong with methods of production—the organization has no inner spur to greater efficiency;**
- **Something is wrong with methods of finance—money lies idle, while slightly better terms would vastly increase the building market;**
- **Something is wrong with methods of location, layout, design and neighborhood control—or "blight" would not descend so rapidly.**

Q. E. D.: "LARGE-SCALE HOUSING"

***AND NOW**, when we are just beginning to attack these traditional problems, we confront two huge new ones:*

1. **The defense housing emergency provides a sobering test: what have we really learned since the last war?**
2. **And when the defense boom recedes and the international crisis shifts to a domestic one, then what? The foresighted are saying: "Housing in a big way . . . or else ? ? ?"**

A BUILDING TYPES STUDY

CATHERINE BAUER, with assistance from SAMUEL RATENSKY, of U. S. H. A.'s Technical Division, surveys the background, attainments, and problems that still face sponsors of multi-family developments, both private and public. . . . And on page 106 EUGENE H. KLABER, F.A.I.A., presents a graphic method of determining the financial practicability of rental projects

A DYNAMIC EQUATION WITH 3

THE EXPERTS . . . architects, planners, technicians, welfare people, civic officials, economists, social philosophers. Although their claims vary greatly in emphasis and are frequently even contradictory, a composite definition of their principles will here boldly be attempted:

"By planning, building and operating a large number of dwellings as one unit: (1) first costs may be reduced by standardization, elimination of middlemen, mass purchasing, efficient land use and layout of utilities and streets, and rationalized production methods; (2) annual costs may further be reduced by investment financing and efficient operation and maintenance; (3) pleasanter living may be provided at no extra cost by superblock planning —substituting playgrounds and gardens and a minimum of access walks and drives for the usual gridiron criss-cross of streets and lots; (4) "blight" and civic waste may be avoided by the use of planned neighborhoods as the unit both for suburban extension and central reconstruction; and (5) essentially the same principles and techniques apply, whether it be housing for middle income families by private initiative, or rehousing the lowest income group with a subsidy by public action— with the added advantage in the latter case of raising the general level of health and civic morale."

THE OPPONENTS OF CHANGE . . . those who guard the status quo, whether from the inertia of habit and established practice, or from direct vested interest. Forces operating against the experts include the following:

Existing street patterns, building ordinances, zoning laws; speculative property values bolstered by congestion or the hope of it, and crystallized by tax valuations. . . .

Lot subdividers; the small builder operating on a shoestring; all builders, large and small, working on a speculative quick-profit basis. . . .

A material and equipment industry horizontally organized (if at all), accustomed to dictating prices and selling through infinite layers of middlemen, and unaccustomed to the principles of standardized mass-production. . . .

Financial institutions geared almost solely to speculative building and the terms of interest and amortization thereby necessitated. . . .

Political opponents of subsidized low-rent housing. . . .

But most of all, those who fear that existing presumed values of residential property, set either by speculative hopes or inefficient methods of production, may have to be reduced if better new homes are available at less cost.

3 ELEMENTS.. *variable but not entirely unknown . . .*

THE PUBLIC who, because they choose the home they buy or rent, elect officials and pay the taxes, will really decide the whole matter. The average consumer rarely acts with scientific precision in his own interest, and is frequently swayed by reasons which make the experts tear their hair. But in the long run he usually takes a common sense line. What does he want in a house, basically, and how does this jibe with (1) what he gets now, and (2) what the experts are offering him?

The popular ideal is still for most families a tailor-made house, free-standing and of "individual" design, on a good-sized lot. But actuality is very far from this for all except the favored few. And there are many strong influences at work which should make the "planned project" more palatable, if what the experts claim for it is true. These influences include:

Increasing identification of health with sun, air, safe recreation places for children;

Greater acceptability of apartments, probably due to busy mothers interested in efficiency and convenience rather than conspicuous waste, and also to sad experiences with speculative home-ownership;

More family social life outside the home, making individuality of facade less important as a symbol;

Vastly increased mobility, in travel and in moving from one town to another . . . (the auto court itself is, for better or worse, a small housing project);

The growing idea of "neighborhood" quality and resources as a thing of importance equal to the house itself.

(N.B. The most recalcitrant representatives of the public with respect to the rational virtues of housing projects are the intellectuals—particularly the large-scale housing experts themselves, who usually live in hideaways in the country or in highly individualistic urban slums. Any really comprehensive and imaginative city plan will preserve at least one badly blighted but picturesque area for the intelligentsia to exercise its ingenuity in.)

. . . . and the equation works this way. If the experts equal E, their opponents, the guardians of the status quo, O, and the public P, then . . .

$$E+P>O \quad \textit{but} \quad E<O+P$$

The big question is not: Are the experts right and the tight-sitters wrong? But, will the public believe they are?

Sketches on this and subsequent pages are by William E. Hainle and B. Leonard Krause, Research Assistants, Bemis Foundation. Photos not otherwise credited are courtesy USHA, FHA, FSA, PBA

From these

HISTORIC PRECEDENTS..... *we now have*

EUROPE

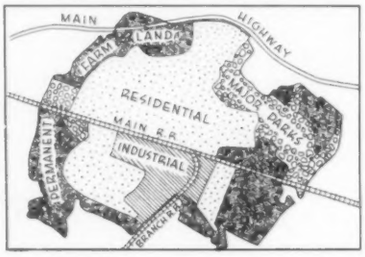
AMERICA

A PUBLIC HOUSING ME

Nyboder, Copenhagen, built 1630

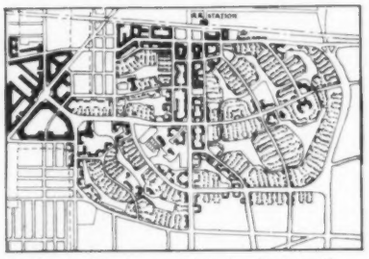
PLANNING IN THE DIM PAST

Chetre Ketl pueblo in New Mexico



Land-use, Welwyn Garden City, England

UTOPIA INTO GARDEN CITIES



Radburn, N. J. superblocks (original)

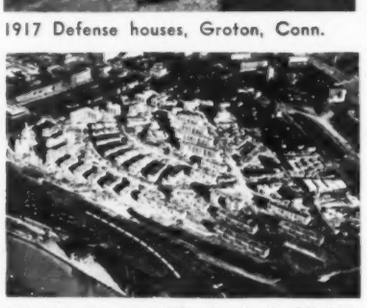
Cul-de-sac, Wythenshawe, Manchester

PUBLIC HOUSING: SUBURBAN

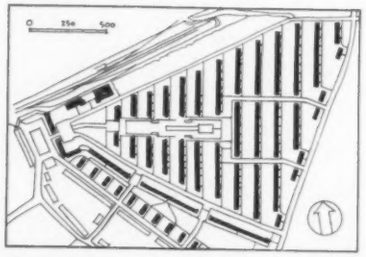
1917 Defense houses, Groton, Conn.

Municipal project, Rotterdam

SLUM CLEARING



Lakeview Terrace, Cleveland, O. (PWA)

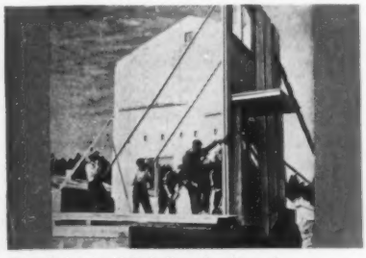


"Zeilenbau" plan, Merseburg (pre-Nazi)

LIMITED DIVIDEND

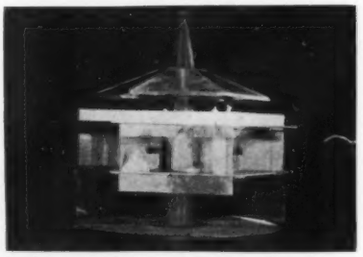
Chatham Village, Pittsburgh

Aerial Surveys of Pittsburgh, Inc.



Swedish "self-help" suburban house

RATIONAL-IZATION



Buckminster Fuller's Dymaxion house

Brentwood Park, Jacksonville, Fla.; Mellen C. Greeley, Archt.

FSA in Washington State; houses rent for $8.25 per month including utilities; one-room shelters for seasonal workers, $1.00

Newton D. Baker village, Columbus, Ga., USHA-financed, for families of noncoms at Fort Benning; L. D. Haines, Chief Archt.

SING MECHANISM . . . . . *and the beginnings of large-scale*

PRIVATE INVESTMENT HOUSING

URBAN. USHA was set up late in 1937. To date there are at least 580 active city and county authorities in 37 states, the District of Columbia, Hawaii and Puerto Rico; 233 of these have funds allocated by USHA. 175 projects, totaling 61,547 dwelling units, have dwellings open for occupancy. 48,363 dwellings are now occupied. Monthly shelter rents average $12.64, plus $5.30 for utilities. In the meantime, 33 localities are building 45 defense projects with Lanham Act funds, through USHA.

RURAL. There are a few rural USHA projects; most are under the Farm Security Administration, which inherited Resettlement Administration projects (including 3 Greenbelts). FSA now administers 20,211 dwellings in rural housing and tenant purchase programs. 13,825 families now live in its 164 projects. Housing is only part of its rural rehabilitation program, which includes everything from rehabilitating existing houses to construction and guidance of agricultural producers' cooperatives. Recent programs are largely devoted to western migrants' emergencies: mobile camps, grouped shelters with central facilities, 4- and 5-room houses. FSA, because it can operate only under the Department of Agriculture's budget, exists from hand to mouth. Now it is called into the defense housing program, for trailer camps and demountable units.

DEFENSE. We're a year ahead of last war in housing necessarily migrant defense workers—but it took 6 months to recognize experienced housing agencies; and their position remains unclear to date. Conservative military antipathies at first ruled out such agencies as USHA: of the first $100 million appropriated, the Navy is building its share directly; the Army turned to the Public Buildings Administration, which ordinarily builds post offices. PBA also had first crack at the Lanham Act's $150 million (largely for civilian defense-workers' housing), but value of experience and success of local authorities with 20-odd USHA-financed defense projects have resulted in changes, and the Lanham Act project score now stands: PBA, 32; local authorities through USHA, 45; FSA, 4; TVA, 2; FWA (through local authorities or direct), 5.

Olentangy Village, FHA-insured, Columbus, O., Raymond C. Snow, Architect

FHA is empowered to insure mortgages up to 80 per cent of valuation, up to 20 years, on large-scale rental projects. Certain controls on rents and return on equity govern for the life of the mortgage. Maximum interest rate has been 4½ per cent plus FHA's ½ per cent. In many projects community planning principles have been applied, often with great success. FHA has insured 274 multifamily projects for 333,361 families, of which 11 have been refinanced without mortgage insurance. About half a dozen projects have more than 500 homes; "garden" apartments of 2 or 3 stories predominate. Average rent is approximately $15 per room per month, or $55 per dwelling—still out of reach of the middle-income group. Olentangy, above, was designed for an average rent of $14.50 per room, $50.98 per dwelling; some projects have dwelling rents under $40.

Since 1938-39, when amendments to the National Housing Act dictated prevailing wages and mortgages limited to construction costs, this branch of FHA activity has been somewhat impeded. Thus it is evident that some problems remain unsolved.

MORTGAGELESS. Metropolitan Life's Parkchester in New York is the biggest housing project in the world built and financed all in one operation, and a dramatic example of mortgageless "equity financing." It has 5,000 apartments renting from $32 for 2 rooms to $71 for 5 rooms (including utilities). This project is preceded by such successes in 100 per cent financing as Buhl Foundation's Chatham Village in Pittsburgh, and is to be followed by other large projects in California. Insurance and financial institutions need outlets for funds; if Metropolitan can demonstrate that well-planned, well-managed, nonspeculative housing can be safely financed, on terms more reasonable than the usual mortgage, tremendous possibilities are ahead. At last private enterprise can tap the middle-income market—and help out a sadly neglected group.

ALSO—In the speculative-home-building field certain trends are worth noting, even if few results are directly pertinent to this study. Fostered mostly by FHA, these include: Virtual elimination of second mortgages; "controlled" subdivisions (sometimes snobbery, often sincere); larger scale enterprise, plus serious attempts at the $2,500 house, some efforts toward rational building practice.

THE BIG QUESTIONS...

1. IS IT REALLY CHEAPER?

ECONOMIES IN CAPITAL COST have not been spectacular. But as designers, builders and manufacturers have gained experience, costs *have* decreased. And they can go still farther down. However, dwellings remain expensive because we demand such a contradictory variety of services from them.

Average value of FHA's 1939 rental projects was about $5,000. Through 1940, USHA's average cost per dwelling (including land but excluding site clearance) was $4,068, with the trend firmly down. Average net construction cost, excluding fees, equipment and overhead, of local authority pjrojects dropped from $2,948 in 1939* to $2,560 in 1940.† In the same localities, average value of residential building permits was $3,867. *And* . . . all public and most private large-scale projects are built at prevailing wages; most projects are "fireproof" or "fire-resistant"; and such projects have to be designed for long life and economical maintenance.

The basic question, however, is *annual costs*—economic rent. Here, together with capital cost, we must consider financial terms, maintenance, repairs, etc. We have perhaps learned something. Monthly charges per dwelling ($3,500 capital cost overall) for a large project recently completed by a western authority are shown in Table 1. Of course, a USHA contribution plus tax exemption would reduce net shelter rent to $11 or $12—but it is worth noting that even at $26, with *no* subsidy, this project would be well within reach of $1,500-income families, now completely outside the new-home market in this locality.

But on the other hand, on 25-year FHA terms (Table 2), rent would be over $35—which means a family income of over $2,000. This difference is vital because at least one-quarter of the families in the area served have incomes between $1,500 and $2,000. Even a 1 per cent interest reduction and 40-year financing would open tremendous new markets.

So the answer becomes: It can be still cheaper, though it's already cheap enough to do a necessary job, *if* it can produce neighborhood conditions sound enough to attract capital on a reasonable long-term investment basis.

TABLE I — USHA

Interest @ 3.62%	$10.50
Operation, insurance, repairs, etc.	8.50
	$19.00
Plus taxes if the project is not subsidized	7.00
ECONOMIC RENT	$26.00

TABLE II — FHA

Interest @ 4½% plus FHA's ½%	$16.00
Return on equity at 6%	4.00
Operation, insurance, repairs, etc.	8.50
	$28.50
Plus taxes	7.00
ECONOMIC RENT	$35.50

*First 4 months
†Last 6 months

2. IS IT REALLY BETTER? *... better than what?*

10 million poorest families live this way

These are average American homes

Can you afford this on a $2,000 income?

3. DOES IT HAVE THE EFFECTS CLAIMED? *They're hard to measure, but...*

Juvenile delinquency is almost non-existent in public housing, though most families come from areas where rates are high. Community facilities are really used; low accident incidence has reduced public liability insurance rates by over 50 per cent; relative health level cannot yet be scientifically determined, but neighborhood clinics are successful

Bad housekeeping, managers report, is no problem; American families respect decent homes when they get them

Evidence that even a very low-rent project stimulates neighborhood improvement, and may (not always fortunately) raise surrounding property values

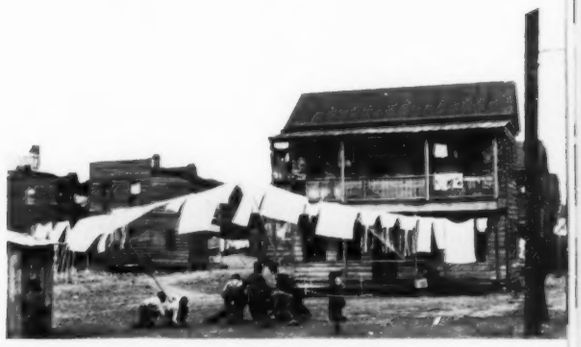
SEVERAL THINGS LEARNED

A few illusions lost...
some problems yet unsolved...

1. LOCATION . . . *To clear or not to clear...*

EMOTIONAL THEORIZING on this question has stirred up many a local controversy. But there *are* no abstract rules. Each potential site must be weighed as to its relative advantages or disadvantages for the immediate purpose, and for the long-term needs of the community. Usually there are at least four distinct kinds of location possible.

	ADVANTAGES	DISADVANTAGES
CENTRAL SLUM SITE	Destruction of an eyesore and social problem area. Convenience to work; minimum dislocation of racial or national groupings. Utilities, schools, transportation available. Possible encouragement of improvements in neighborhood (not always an advantage).	Expensive—hence higher rent subsidies. Difficult to acquire—many small parcels. High cost may lead to "freezing" undesirable densities. May be swamped if not big enough. Frequent unsuitability of slum sites. Decrease in supply of dwellings for a year; problem of relocating evicted tenants.
BLIGHTED AREA	May be cheaper than above, but still convenient, etc. May have strategic advantage in stopping spread of blight, reviving neighboring districts. (Henry Wright)	Less direct attack on slum problem, plus lack of public education in planning, may undermine popular support. Probability of more homeowners here than in slum areas may mean trouble in acquisition.
OUTLYING RAW LAND	Cheap, easy to acquire, quick. Can be planned entirely fresh. May protect from spotty subdivision or shacktown blight. Relieves shortage, at least until "equivalent elimination" develops elsewhere. By syphoning slum population, facilitates systematic condemnation elsewhere, may facilitate eventual purchase of slum property.	Possible additional municipal cost for new schools, transportation, roads, etc. Possible additional tenant cost for transportation. Possible encouragement of city expansion beyond ultimate needs. Undesirability of dormitory suburbs. (If beyond city limits, modest-income families won't pay taxes enough to support adequate services.)
VACANT SITES IN BUILT-UP AREAS	Cheaper and easier than reconstruction, more convenient than outlying. Possibility of utilizing sites passed over by subdividers seeking standard footage.	Meager supply of suitable tracts. Danger of using land which might better be turned into parks.



SLUM: Site of Robt. Mills Manor, Charleston, S. C.

BLIGHTED: Site of Peralta Villa, Oakland, Calif.

OUTLYING: Parkdale, Great Falls, Mont.; A. V. McIver, Archt.

VACANT: No. Blvd. Homes, Tampa, Fla.; M. L. Elliott, Archt.

About half the public projects involve clearance and reconstruction; most cities have "balanced programs" with several kinds of site. Private projects rarely resort to clearance; they lack condemnation power. In the east clearance is popularly favored because it is dramatic, and because it may shore up property values. But in the west, slums are spotty, often not recognized as such, and this situation frequently is reversed.

NEEDED: Measures to reduce cost of central slum areas. (Systematic condemnation under police power; strict rezoning with adjustments in tax valuations; possibly the English system—pay nothing for *buildings*.)

Regional land-use control to establish specific areas for development, to direct coordinated public and private building, residential and otherwise, into such areas.

Responsible local and regional planning commissions with sound premises as to the whole future development of their communities and hinterland. This means more and better planners as well.

Contrast Fort Greene Houses, Brooklyn, N. Y. (W. F. R. Ballard, Consulting Archt.), with Rosewood, Austin, Tex. (Page & Southerland). Three groups of associated architects are collaborating on different sections of Fort Greene

2. HOW LARGE IS LARGE-SCALE?

RATIONALIZED large-scale building has certain real advantages and economies . . . but this doesn't mean the larger the better under all circumstances. The principle of super-block, and the use of standard units within a flexible plan, can be successfully applied in very small groups of homes, as witness the Texas project at left. (USHA thinks that under ordinary circumstances economies are not much greater over 300 units, until the Parkchester scale is reached, where Metropolitan was in a position to bargain for the output of whole factories in some cases.)

NOT ENTIRELY SOLVED: Variety of aspect in very large projects, although Fort Greene, by giving a fairly free hand to different groups of architects, is worth watching.

UNSOLVED: Variety in the social and economic groups provided for, to avoid unhealthy segregation.

EQUALLY UNSOLVED: Methods of fitting private and public action, new construction and modernization, together into a comprehensive rehabilitation scheme, or the orderly development of new suburban communities.

3. IN THE MATTER OF STANDARDS . . . . . *a revolutionary principle*

ONCE MINIMUM STANDARDS of light, air, sanitation, privacy and convenience are accepted in the public interest, and good construction in the interest of long life and low maintenance costs . . . then major class distinctions and symbols of relative pecuniary success are no longer feasible in the general aspect of housing. More space, a few more gadgets, more luxurious materials . . . that's about all.

The only answer to the "too good" argument is that everyone who wants it ought to have housing at least *as* good . . . This principle does not imply regimentation. There is still plenty of room for variety by virtue of different types of use, location, and architects' ideas . . . and for individuality in gardens and interiors.

THE PROBLEM: Don't let this principle work backwards, as it did in England where private housing in the late boom apparently had to look "different" from council housing, at whatever cost in stained glass and gimcracks.

MASS PRODUCTION + **RATIONAL PLANNING** + **MINIMUM STANDARDS** = ELECTRIC LIGHT, DOMESTIC RADIO

4. AS TO SITE PLANNING . . . . . *we've learned a lot*

A GOOD SUPERBLOCK plan really does save money in development over the usual gridiron schemes. ($200 per family in the cost of walks, drives, garages, water lines, sanitary and storm sewers, according to a recent analysis by Kline Fulmer.)

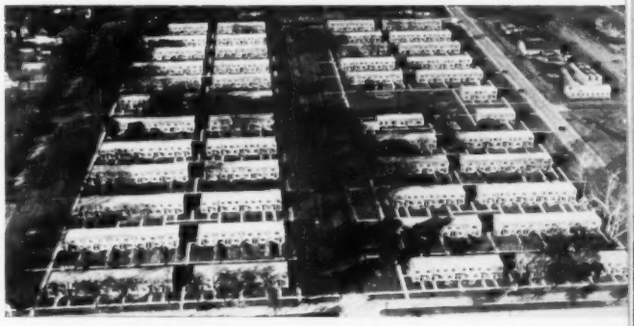
But the most substantial reason for it is that it makes a pleasant place to live in and bring up children.

Are the backs of speculative houses . . .

. . . better than a superblock's interior?

THE LONG STRAIGHT carefully oriented parallel rows of identical buildings we inherited from modern housing practice in pre-Nazi Germany are still usually the cheapest and most strictly "functional" way to lay out a housing project. . . .

But they can be very dreary, even to a sophisticated modernist eye. Also, the maximum sun at all periods of the year for everyone is not an unmitigated blessing in most parts of this country. Other things must be considered: the view, inward and outward (good or bad); grouping of buildings on a more human, less formal scale; separation of service yards from recreation areas, not necessarily of identical width; and the virtue of supplying different types of accommodation, requiring different building types and heights.



First came mechanical rows . . .

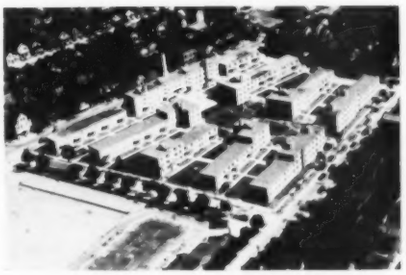
. . . but planning is now more human
(Dixie Court, Ft. Lauderdale, Fla. R. T. Pancoast, Supv. Archt.)

COMMUNITY PARKS with all open space landscaped by the management make handsome air photographs. . . . But private gardens, with row houses and flats, are cheaper to keep up and probably more useful and livable for most American families. (There's nothing wrong with the old theory that you need an occasional neglected garden to prove the others good.)

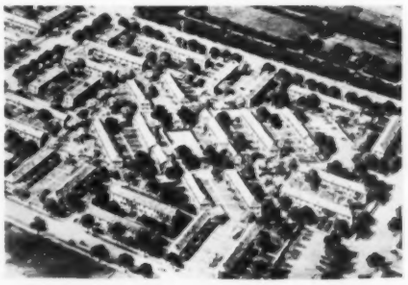
GARBAGE . . . Centralized services save time and labor for the tenant. But incinerators, central heat and hot water, etc., are frequently incompatible with minimum or moderate rentals

GARAGES . . . Most people are willing to walk 300 ft. or more to their cars, in return for a quiet, green, usable environment. In the very lowest rent projects only parking places are provided. Shelters are enough in such moderate rental developments as FHA's Wyvernwood

The whole matter of what is good **ZONING** may have to be reopened. . . . Good modern community planning frequently runs counter to even the reputedly best current zoning ordinances—by grouping homes and pooling open space, by introducing different types and heights of building for variety of use and aspect, and by including such neighborhood needs as shops and community buildings.



DENSITY of buildings and population should obviously, according to any sound land-planning theory, be determined by the most suitable type of use for the particular people and area, and the desirable overall density pattern of the city.



But neither housing authorities nor private builders have yet found a way to evade the fact that high land costs seem to predetermine less land per person in the project. Perhaps, when tax payers and city officials are better educated in city planning matters, they may agree to a policy of "breaking" speculative or exploitive land prices by (1) drastic rezoning, (2) reduction of tax assessments in return for low open building, and even (3) public building of—say—two-story homes on the lower East Side, to establish thus dramatically a new standard of land-use for the whole area.

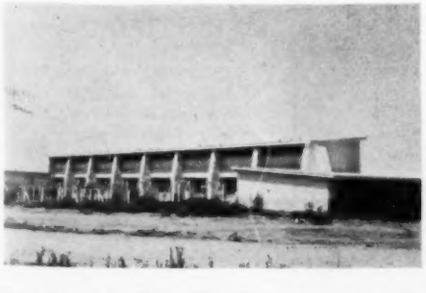
5. BUILDING TYPES .... *old and new*

SHIFTING IDEALS . . . SKYSCRAPERS and "model tenements" were the romantic idolum for most Cities of the Future in the roaring twenties. . . . But the trend in multiple housing is now definitely toward two and even one-story structures; the top limit for walk-ups has descended from five to four to three stories.

BASIC PRINCIPLE . . . A GOOD ROW HOUSE is not only cheaper and more efficient than a free-standing house on a narrow lot . . . it saves useless open space for a park or playground or garden, and actually has more privacy. Also, due to lack of public halls, possibility of private gardens, and tenant maintenance, row houses or 2-story flats can usually be rented more cheaply than equivalent apartment buildings.

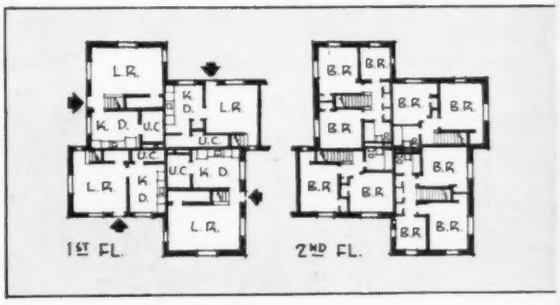
BEST APARTMENTS are shallow buildings, two rooms deep, as straight and unbroken as possible, with two apartments per stair hall—hence with cross-ventilation. But in elevator buildings where even moderate rents are important, more than two apartments per entry hall are an economic necessity. And even in Queensbridge there had to be wasteful apartment foyers hopefully labeled "dining alcoves." Balcony corridors for outside access are successful on the West Coast.

AND OUT IN THE COUNTRY . . . .



Row houses in FSA's Chandler, Arizona, part-time farm project have adobe party-walls; FSA farm labor homes at Winters, California, are free-standing, in groups. Others provide bare shelter plus central utility buildings

One-story double house, by FSA at Ceres, California



Quatrefoil scheme, from USHA

Three-story duplex, Potrero Terrace, San Francisco

Parkchester, New York; R. H. Shreve, Chief Archt.

Queensbridge Houses, New York; W. F. R. Ballard, H. S. Churchill, F. G. Frost, B. C. Turner, Archts

Two-story apartments with outside corridors, California

TWO THINGS NEEDED: Modernized zoning and building ordinances; prefabrication research and experiment geared to flexible "group housing" instead of just to individual houses.

PLAY area, Holly Courts, San Francisco; A. Brown, Jr., Archt.

SPRAY POOLS are frequently provided

Social room, Community Building, Oglethorpe Homes, Ga.

Laundry, solar water heater, Dixie Court, Ft. Lauderdale, Fla.

6. SOME COMMUNITY FACILITIES . . .

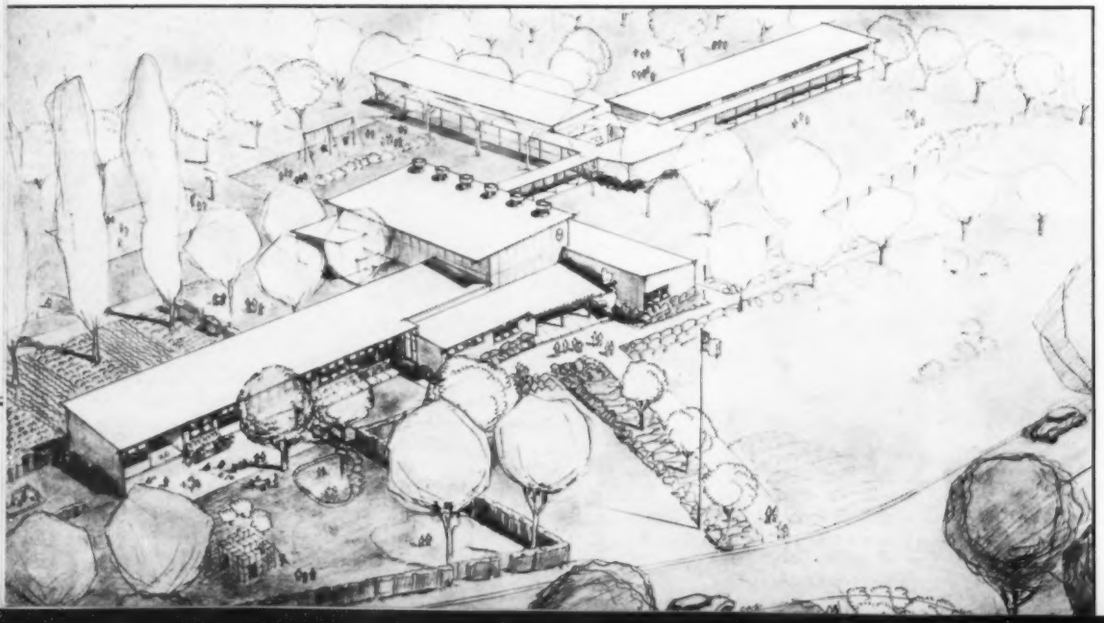
are now standard equipment

ESSENTIAL PARTS of the "complete neighborhood" so dear to the heart of the planners are many things besides houses. Most of them cost money, unfortunately, and only the Greenbelt Towns are really complete in any ideal sense. Nevertheless . . . play areas for small children (*never* say "tot-lots") are always provided in USHA and usually in FHA projects.

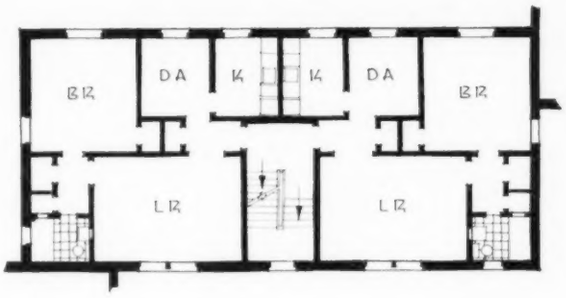
Some indoor social space, large enough for gatherings, and equipped with cooking facilities and toilets, is also usually provided in public housing projects. Too often this is merely in a basement. Big projects can support real community buildings, however, which may include auditorium, clinic, workshops, etc. A great many critics feel that the major purpose of the low-rent housing program will be lost if we do not raise standards of community facilities. Simple space for a nursery school, usually double-duty, is frequently provided in public housing projects *if* responsibility for operation is assumed by some agency outside the project. As time goes on, this is likely to become standard equipment in every project of any size. Spray pools are often provided, never swimming pools (although the pool at PWA's Carl Mackley Houses in Philadelphia has, by making a small charge, been able to cover more than operating expenses).

A GENERAL PRINCIPLE for all housing projects: community recreational facilities should be designed for the use of the entire neighborhood and not restricted to project families

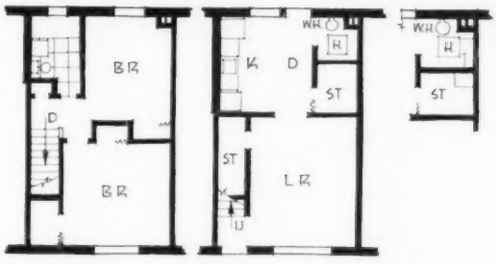
AND AN UNSOLVED PROBLEM. Although "built-in" shopping centers would add greatly to the convenience and looks of most large projects, public housing policy never includes stores at present—partly to avoid the gamble of operating them, more to maintain good relations with existing neighborhood retailers



FSA camps' minimum shelter is compensated by such community centers as this, now building at Woodville, Calif., which includes assembly, nursery school, clinic, library, home economics room, and has adjoining school

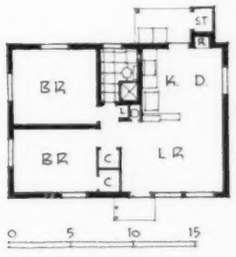


FHA: Shallow building only two rooms deep; through ventilation in every apartment; only two apartments per floor per stair hall; minimum corridor area; reasonable closet space; adequate wall space for furniture



USHA: Twinning of plumbing stacks for both kitchens and baths and vertical alignment.
"Zoning" of storage facilities in accordance with management experience:
a) general storage under stairs
b) kitchen storage separated from heater room for cleanliness and convenience
c) heater room directly adjacent to outdoor coal storage
d) ample dining space in kitchen or living room

PRIVATE: Metropolitan's Parkchester, multi-storied and hence requiring several apartments per elevator, cannot provide through ventilation in all apartments. Three different vertical cores, to which may be attached any of 5 typical apartment wings, provided standardization without regimentation. Use of identical baths and kitchens, and similar economy measures, were not allowed to preclude ample furniture space, closets, etc.



FSA typical one-story individual house for the west coast. Has one-third acre for subsistence garden. Compact, ultra-simple walls, rooms; minimum hall space; each bedroom sleeps two; couch in living room if necessary; utilities backed; living and work space open through into one another

Above are current standard plans, showing equipment ordinarily provided, and some of the reasoning behind each particular layout

7. *Rationalized*

DWELLING PLANS AND EQUIPMENT

THE BIG ISSUES frequently center around the small items: When is a *mechanical* refrigerator "too good"? (Congress recently took that one up, in arguing the additional allocations under the Lanham Act.)

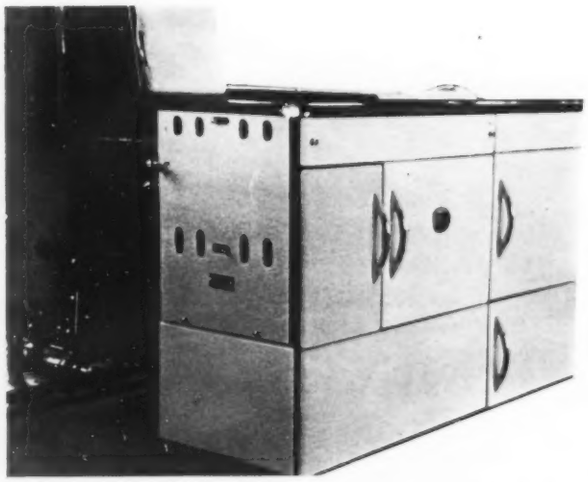
Closet doors for public housing? (Mrs. Roosevelt thinks yes; USHA thinks no, except for one general storage closet.)

Porches and balconies? (Many Europeans say yes; most Americans, at any rate those who "review" projects, say no.)

Can X's "front" door face Y's "back" yard? (Why not, if both X and Y get more livable dwellings and better land-use that way—but will they like it?)

8. CONSTRUCTION MATERIALS *and*

Buckminster Fuller's "Mechanical Wing," in which are combined in one mobile unit all essential services, is the most advanced of the theoretical fabricated possibilities. Bath, heater, laundry and kitchen are incorporated in the "Wings" trailer.



"Three-way heater" (coal range, hot water heater and furnace) developed by Anthracite Industries Laboratory with USHA. Complete dwelling units have been successfully undertaken by such pioneers as American Houses, Inc. (Holden, McLaughlin and Associates, Consulting Architects); but by 1940 their 1932 houses asbestos, aluminum, and unashamed—were clothed in shingles—still, however, asbestos. And the frame, for ease of fabrication, has changed from steel to wood-and-plywood, factory-assembled. Both high-rent apartments and low-rent workers' houses have been built

THE "FORD HOUSE" idea, factory-packaged of synthetic materials and delivered hot to your lot, is pretty dead . . . however, the pre-fabricated bath-kitchen unit has some real possibilities. Buckminster Fuller's "Mechanical Wing" is the most advanced expression of this idea, but the American Radiator & Standard Sanitary Corporation has been making progress with a utility wall, kitchen on one side, bath on the other.

Experience with panel fabrication, particularly plywood, does indicate great potential usefulness at least where speed or high salvage value are prime considerations—and we have a right to expect some positive demonstrations in the defense program.

But otherwise, even allowing for the conservative pressure of local building ordinances, union practices, and traditional material interests, the old materials seem to be about the best for most all-round purposes, especially long-term economy.

Except Fort Wayne, the local authorities have admittedly made rather few experiments with new materials or processes thus far. But USHA has done considerable research, often in cooperation with manufacturers, with such practical if unromantic results as the 3-way heater illustrated. A Congressional allocation for bona fide research and experiment through the Bureau of Standards, directed by the housing agencies, would prove very fruitful at this point.

It is only realism to face the fact that, in a program as controversial and experimental as this, in any case, you can't buck everything and everybody all at once. First things must come first—and the first things in this case are proper land-planning, design, job organization, and financing. This means, however, establishing a framework within which any potential innovations in materials, however revolutionary, can be much more effective than they could ever be in the present single-lot speculative-builder pattern.

Rational organization of the job (bench fabrication by FSA, precutting by American Houses and others, application of skyscraper-refined production methods to housing work by contractors) has already made considerable strides.

METHODS

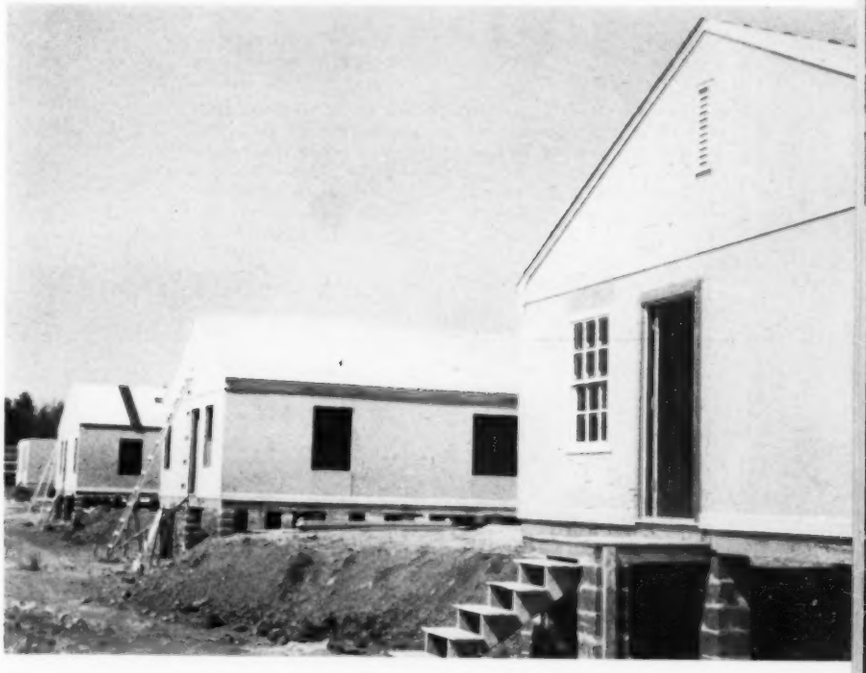
The Fort Wayne Housing Authority's first project, heard 'round the world, was plywood prefabricated by WPA; houses to be moved from one lot to another (at top). . . . But the same Authority, for one reason or another, now builds much more traditional projects through USHA (above)

PROBLEMS, of course . . .

The TNEC recommends to the housing industry:

Research ("most important")
Standardization
Trust- and collusion-busting
Building code revision
Scientific management
Mechanization

Only very large-scale enterprise, private and public, strong enough to say when necessary, "If *you* won't do it, then we'll get it done ourselves," can make a dent in most of these problems.



A PBA experimental project at Indian Head, Md., of prefabricated demountable houses

Rationalized and mechanized USHA job operation: excavation by mechanical trench diggers

Planned and integrated construction methods on a PBA defense project

Standardized mass production on the site, for FSA farm homes, unimpeded by building codes

9. *On the aesthetic side...* IS HOUSING ART?

ONE THING IS CLEAR: appliqué "Architecture" merely piddles and cheapens a housing project. Real architectural effect depends on bold masses and arrangement, on landscaping, and on careful design of standard details—especially windows, roofs, and entrances. At least, public housing can't afford even a descendant of gay nineties décor, which can be pretty dull. . . . And nature probably contributes more than buildings to a project's attractiveness.

BALCONIES are standard equipment on Swedish and English apartments for use *and* beauty . . . but here the PWA was condemned for such extravagance as this, in Cleveland. Should we relax on this point?

ENTRANCES all treated as "focal points" become ridiculous mimicry in a long row of houses. Even the purest classic taste is better served by the simplicity of Liberty Square, Miami; H. D. Steward, Ch. Archt.

ROOFS with an overhang, like this from Los Angeles county, prevent 2-story brick rows from looking like old freight cars on a siding. They add delicacy, and prevent summer sun's glare. Reginald Johnson, Archt.

WINDOWS can make or break a housing project. And they don't have to be fancy to be good, as witness the plain doublehung sash on the little FSA house at left. High horizontal strip casements frequently merely prevent tenants from seeing anything but another building, and tiny panes are an insult to the planning profession. Glass to the ground gives the double house in a small private California project elegance and openness (right)

A PROPOSITION: The tax-payers' investment in public housing has incidentally financed the education of about a thousand architects in the elements of housing design. There should soon be a larger percentage of projects which accomplish more, visually, than mere crystallization of minimum standards. . . . But it's not all the architects' fault. Housing projects usually have to use stock windows, hardware, fixtures . . . and good inexpensive designs are frequently just not available.

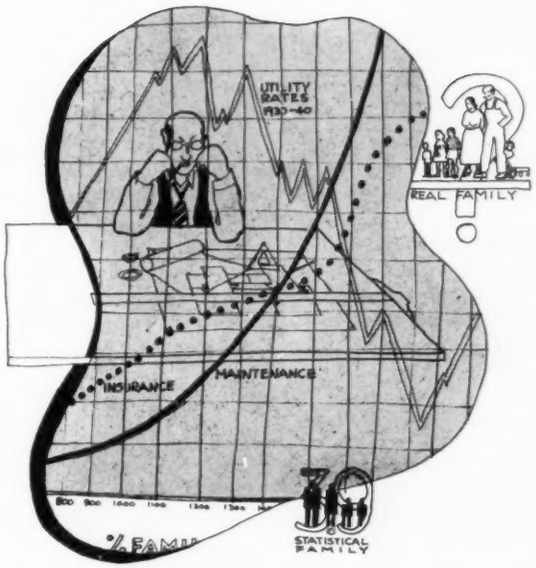
10. LARGE-SCALE HOUSING *in* OPERATION

REAL STRIDES have been made in reducing operating expense, the cost of use—including negotiation of wholesale utility rates (reductions now average $5 per family per month)—and substantial insurance reductions. In one large eastern city, PWA and USHA projects combined to save over $100,000 annually on electricity.

Experience with tenant maintenance: care of landscaping is an essential and popular part of operating policy in hundreds of USHA projects. In Washington, Jacksonville and other USHA projects, tenants paint dwellings with the management's paint; in many apartment-type units, tenants maintain stair halls.

The local authority or private entrepreneur should hire both a good management chief and architects—and see that they collaborate.

QUESTIONS: Who will live there? And how can some of that deep driving desire of American families to improve their home environment be transformed into a dynamic push for more and better community housing—public *and* private? Is individual ownership possible in large-scale housing, and what strings would have to be attached? Cooperative forms of initiative and management should certainly be devised and encouraged . . . also some means of avoiding paternalism, increasing stability of tenure, and using potential initiative.



Some concrete things already learned: to design community spaces flexibly, for multiple use; to design outdoor space for use, not decoratively; to design heating systems with a temperature range 5° to 10° less than that commonly accepted; importance of, and means of preventing, condensation in roof structures; to locate radiators and openings so furniture can be well placed.

11. . . . *and finally, the matter of* FINANCING

FOR PUBLIC HOUSING, financial *methods* are pretty well solved, even though adequate *means* are still a question. The steady decrease in annual subsidies required to reach necessary low rent levels, both in actual dollars and in proportion to capital cost, has amply demonstrated the virtues of this form of assistance—in flexibility, and in maintaining a vigilant regard for economies in both capital and operating costs.

The increasingly interested private market for the bonds of local housing authorities, at rates even lower than the government can legally charge, indicates the probability that very little public capital will be required to do the big public housing job of the future.

But more annual subsidies *will* be required—and these can be made available only by Congress.

PROBLEM: How to make public housing the relatively healthy and non-partisan issue in Congress that it already is in hundreds of localities "back home."

FOR PRIVATE LARGE-SCALE BUILDING, financing is still one of the biggest headaches. Decent new homes within reach of any large part of the middle third income-group absolutely require better terms than 4½ or 5 per cent for 20 years. The Metropolitan, by demonstrating successful equity financing and direct initiative by a large potential source of investment funds, points one way. There must be others. (The TNEC recommends raising the 80 per cent mortgage-to-value ratio on FHA's insured rental housing projects to 90 or 95 per cent, reducing interest rates, and restricting rents rather than limiting return on equity. This should be given serious consideration, although it raises certain administrative questions.)

WHAT'S NEEDED, specifically: Longer term, lower interest financing for large-scale private projects, with enough public control to insure both low rents and the planning standards which would justify reasonable financial terms.

The proper formula for enlisting private as well as public enterprise in planned rehabilitation (such a proposal was recently made to financial institutions in New York for a vast enterprise on the East Side, but it was turned down)—and also in new suburban areas where and as needed.

The proper formula for cooperative enterprise. (A little initiative in this field from some of the housing experts now hidden away on romantic but sub-standard farms would do wonders.)

ANALYSIS OF RENTAL HOUSING PROJECTS

by EUGENE W. KLABER, F.A.I.A.

Experience with almost two thousand housing projects has shown that at least three projects out of four proposed were never built. Architects, builders and promoters have expended effort and money, only to find their efforts wasted. Frequently this has meant serious financial loss to the architect, first to be asked to spend money on a housing project; but even though his preliminary work has been paid for, there is economic waste involved. What causes this waste? Can it be avoided?

In many cases a project fails of acceptance for a mortgage for reasons that cannot be foreseen. For instance: sponsors feel they have a good site, but lenders disagree: ~~equity money is not~~ forthcoming; legal difficulties prevent acquisition of land; final bids on construction are beyond expectations. These are the fortunes of war.

But there are many cases—in which location is good, equity adequate, sponsors reputable, design competent—which nevertheless are disapproved because appraisal of the project as presented proves it economically unsound. To clarify the analyses here presented, a brief summary of postulates of the appraisal of rental housing projects is in order.

What is economic soundness? Economic soundness requires that *value* of the project shall equal or exceed *cost*.

Cost, or summation value, of a project is the estimate of the expenditures necessary to produce it. Costs may be grouped into three general categories: cost of land, cost of improvements, and carrying charges during construction.

Value, in rental housing, is conceived as the present worth of a series of annual benefits accruing to the total capital invested. Such annual benefits are what is left of the rental after expenses and taxes have been paid, reserves set up for replacements and depreciation deducted. The capitalization of these net benefits is the value of the project; in other words, the amount investors are assumed to be willing to place in a housing venture, with the estimated return as an inducement. Capitalization of future income involves consideration of five principal elements.

a. How much net income can the project produce when new?
b. When will it reach full productive power?
c. If net income will decline with the years, how rapidly? (Premise of declining income.)
d. How long will the project continue to produce a substantial income? (Economic life.)
e. At what rate of return will the project attract money? (Capitalization rate.)

It is not the purpose here to discuss all considerations that enter into the appropriate capitalization factors in a given case. Suffice it to say that the greater the risks presented by a proposed project the higher the capitalization rate. Thus a combination of rentals well below the market, good neighborhood with prospective desirable growth, presumably low vacancy percentage, and well designed structure may prompt assumption of a capitalization rate as low as 6%, whereas adverse conditions may warrant a rate as high as 10%. As an example: The assumption of the most favorable premise of declining income, an economic life of 50 years, a capitalization rate of 6½% and a deferment of 40% of income during the first year of operation, is an indication that appraisers consider the project highly desirable.

Tables, based on the elements listed above, give factors which, multiplied by estimated net income, indicate value of the project. They also allow for depreciation, so that in practice, net income before depreciation and fixed charges is capitalized into value.

So much for determination of value. What the architect wants to know above all is how much can be spent for improvements. With these he deals directly; when value has been determined by capitalization and the assumption made that cost and value are the same, how much will be available to spend under his direction for land improvements, buildings, landscape work and professional fees? Obviously this amount equals value, minus cost of land, minus carrying charges. That's all there is; if it isn't enough to permit him to design buildings appropriate to the intended use, he may as well drop the deal at once.

As value determines the total to be spent, it becomes evident at once that, as more is attributed to land cost, less can be spent on buildings; indeed when land cost absorbs too large a part of value, no buildings can be built at all. The importance of land cost and land taxation becomes evident in our method of analysis. The higher land cost goes the more it drives the architect into a corner, until at a certain land cost he cannot function. Because land cost is so important, it has been made a variable in our analyses. These start always with what is perhaps the most rigid element in the financial setup—the rental that can be obtained for a given type of accommodations in a given neighborhood.

It is our purpose to show by two examples a method of analysis by graphs which can be applied in advance to housing projects and which will enable architects to avoid some of the pitfalls into which we have seen them stumble. While the method is a close approximation of appraisal technique, it does not pretend to mathematical precision. Minor factors in appraisal have been ignored, e.g., garage incomes. On the other hand, it is close enough to the truth to indicate when a project is in the danger zone of economic soundness.

Since the accompanying graphs represent resultants of whole series of surrounding circumstances, each project will have a graph of its own. As a matter of convenience the projects discussed have been analyzed on the basis of a single room—hence it is of prime importance to determine how much land is attributable to each room in the project.

BY GRAPHS

CASE 1

CONDITIONS OF THE PROBLEM

Location. This project is to be erected in New York City, under jurisdiction of the New York State Division of Housing. Hence rental per room may not exceed $12.50 per rental room per month, or $13.52 per construction room per month; further, gross area of habitable space may not exceed 2.7 times net land area.

New improvements will not be taxed for a number of years. Taxes will be levied in a predetermined amount and, as improvements are not taxed, will approximate present land taxes—2.98 per cent of assessed valuation.

Present assessed valuation (land) is $5.00 per sq. ft. and the project must show a return that justifies an assessment between $4.00 and $5.00 per sq. ft. High land cost makes it necessary to erect elevator buildings at least six stories high, perhaps higher.

A study of apartment units appropriate to this rental indicates that area of habitable portions of the structure will equal 221 sq. ft. per room.

To operate buildings of this type will cost about $61.00 per room per annum, including reserves for non-recurring replacements (refrigerators, ranges, etc.).

Since rentals are distinctly lower than similar neighboring accommodations, a low vacancy allowance—7 per cent—is assumed, instead of the usual 10 per cent. It may also be assumed that the project will achieve maximum earning power at the end of the first year, and will earn 50 per cent of the maximum during the first year.

For projects of this type carrying charges during construction average 3½ per cent of the cost of physical improvements.

Can an economically sound project be produced under these circumstances?

ANALYSIS BY THE ARCHITECT

"I have a double limitation—maximum rental and maximum coverage. Can I design a building that will justify a land value between $4.00 and $5.00 per sq. ft.?

"Starting with available rental, I must investigate the effect of varying land costs starting with zero, to determine the residual amount for improvements. Hence I must determine area of land per room, its cost and taxation at various valuations. Suppose I try successively $0, $1, $2, $3, $4 and $5.

"Since my average area per room is 221 sq. ft., and this may not exceed 2.7 times land area per room, minimum land area per room is 81.8 sq. ft. The following tabulation results:

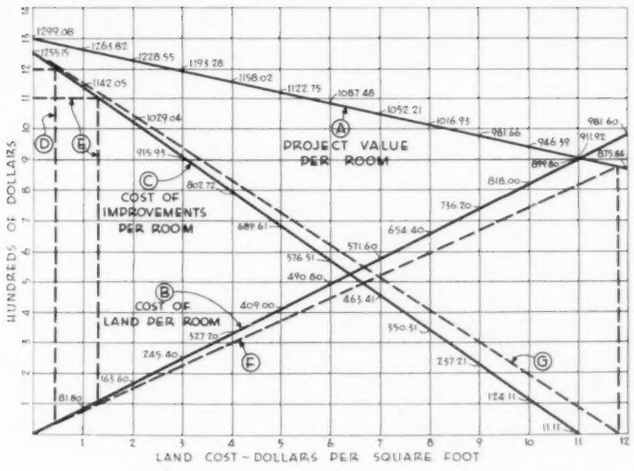
CASE	LAND PRICE PER SQ. FT.	PER ROOM	TAXES PER ROOM @ 2.98
A	—	—	—
B	$1.00	$81.80	$2.44
C	2.00	163.60	4.88
D	3.00	245.40	7.32
E	4.00	327.20	9.76
F	5.00	409.00	12.20

"With these data I can determine value of project in each case.

CASE	A 0	B $1	C $2	D $3	E $4	F $5
Rent per annum @ $13.52 p. m...	$162.24					
Less 7% vacancy equals.....	150.88					
Less operating expense $61 per an..	89.88	$89.88	$89.88	$89.88	$89.88	$89.88
Deduct taxes on assumed land value	...	2.44	4.88	7.32	9.76	12.20
AVAILABLE FOR DEBT SERVICE (Net Income)	89.88	87.44	85.00	82.56	80.12	77.68

"Money available for debt service in each case is the amount capitalized to obtain value. No deductions have been made for taxation on improvements; sole variant has been taxation on land. The higher the land price, the greater the deduction and hence the less the net income. Thus it is evident that, other factors being the same, *the more the land is valued, the less the project as a whole may be valued.*

"Low rental, willingness of bankers to lend on this project at low interest, desirability of the neighborhood, and prospects of continued desirability warrant a very favorable rate of capitalization. I shall therefore assume a 6% rate, 50-year economic life, the most favorable premise of declining income. My appraisal tables indicate a factor of 13.982 times net income, if full income is deferred one year, to which value I must add



the present value of half a year's income. (50% x net income x 0.943).

Cap. factor 6% 50 yrs. A premise 1 yr. def.						
13.982 x availables.....	$1,256.70	$1,222.59	$1,188.47	$1,154.35	$1,120.24	$1,086.12
Add 50% x .943 x availables	42.38	41.23	40.08	38.93	37.78	36.63
Capitalized value per room	1,299.08	1,263.82	1,228.55	1,193.28	1,158.02	1,122.75

"At this point I can start preparing my graph. I note that each dollar increase in land cost forces a reduction in capital value per room of $35.27 per room. I can therefore readily project my graph beyond assumed land values. Line **'A'**, Figure 1, is the platting of the descending total value of the project per room as land value increases.

"If capitalized value equals summation, to obtain possible value of improvements I must deduct land value and carrying charges.

CASE	A	B	C	D	E	F
Land Value	0	$1	$2	$3	$4	$5
Capitalized value per an..	1,299.08	1,263.82	1,228.55	1,193.28	1,158.02	1,122.75
Land value	0.00	81.80	163.60	245.40	327.20	409.00
Available for improvements and carrying charges....	1,299.08	1,182.02	1,064.95	947.88	830.82	713.75

"Assuming 3½% carrying charges, divide above results by 1.035 and the following amounts are available for improvements:

A	B	C	D	E	F
$1,255.15	$1,142.05	$1,029.04	$915.83	$802.72	$689.61

"I may now complete my graph, showing the ascending line of land cost **(B)** and the descending line of improvement cost per room **(C)**.

THE ARCHITECT'S INTERPRETATION OF THE GRAPH

"I have been asked to design structures to justify a land value between $4.00 and $5.00 per square foot. My analysis tells me that I must produce them to cost between $690.00 and $802.00 per room to include land improvements, landscape work, buildings and fees. Not a chance! I know perfectly well that I can't produce elevator buildings for that. There's something wrong; let's look a little further. To have a proper allowance, land must be valued much less than $4.00 per sq. ft. Examining the chart again, I find that even if the land is worth nothing my costs may not exceed $1,255.15 per room, and if the land were worth a little over $11.00 per square foot there would be nothing left for buildings!

"Let's try to see if we can do anything from the other end. I believe I can design an elevator building to cost $1,200 per room all told. Line **D** on the graph indicates that land may not cost more than 44 cents per sq. ft.! This is a far cry from what my associates anticipated; they paid more in cash! I must reduce building cost. If I use three-story walk-up buildings, I can bring it down to $1,100 per room; we'll try that! Since **E** indicates that land may cost as much as $1.35 per square foot, perhaps they may accept this valuation. Originally I was counting on nine-story elevator buildings with 30 per cent coverage. If I use three-story buildings and wish to hold the land price per room down to the same amount, I must triple the coverage—but 90 per cent coverage won't pass code requirements. Hooked again!

"How can I get out of this deadlock? I might assume a higher rental; that will give me more net income to capitalize. When I do that, however, improvements won't be tax-exempt, and taxes reduce net income more than the increase of rental, unless I assume a rental so high that the buildings in this

neighborhood cannot command it. So I wouldn't be any better off; besides, the added risk would incur a less favorable capitalization rate.

"If I increase the number of stories, I lose tax exemption, because of excessive coverage. I must also consider that I may need more elevators and my open areas will be inadequate.

"I might try a smaller room size; perhaps an average gross area of 200 sq. ft. would give me a plan whose rooms could still rent at $13.52 P.R.P.M. If I do this my land cost per room would be $\frac{200}{221}$ of the costs shown on line **B**. Platting this line to the point where nothing remains for the buildings gives me lines **F** and **G**, the latter being a new series of amounts available for improvements. But now land costs increase only a few cents.

"I cannot therefore avoid the conclusion that, with the necessary rental and area limitations, it is impossible to do a job on this site. Either we must find less costly land, or there is no deal. Cancel that ad in the *Times* for draftsmen."

CASE 2

CONDITIONS OF THE PROBLEM

This project is to be erected in a large southern city; the neighborhood is distinctly residential. Growth of the neighborhood has been orderly and there is every prospect that it will retain its desirable character for years.

Land cost is 11 cents per sq. ft. This low price will permit erecting two-story apartments with central heat and hot water. Buildings more than normal dwelling height would not suit the neighborhood. Coverage of 22 per cent is sufficient. This means about 483 sq. ft. of land per room.

Tax rate applicable to both land and building is 0.9125 per cent.

In this desirable section of town a rental of $12.75 per room per month can be obtained, provided the rooms are of good size.

Sponsors believe this rental can be obtained for the accommodations shown in rough sketches; unit plans indicate an average of 212.4 sq. ft. This type of unit can be erected for about $1,000 per room including fees and landscape work.

Operation and reserve allowance in this case should be $45.50 per room per year.

A 10 per cent allowance should be made for vacancies, etc. Carrying charges during construction will run about 3½ per cent of the cost of physical improvements.

This example is somewhat more difficult than Example I, but the basic principle is the same. That is, the graph starts with a land value of zero and covers successively all land costs to the point where there is nothing left with which to build. The added difficulty is the fact that we cannot proceed directly to capitalized value of the project, because improvement cost (and consequently taxes on improvements) are variables. Eventually a deduction from capitalization must be made equal to the capitalized value of this tax.

ANALYSIS BY THE ARCHITECT

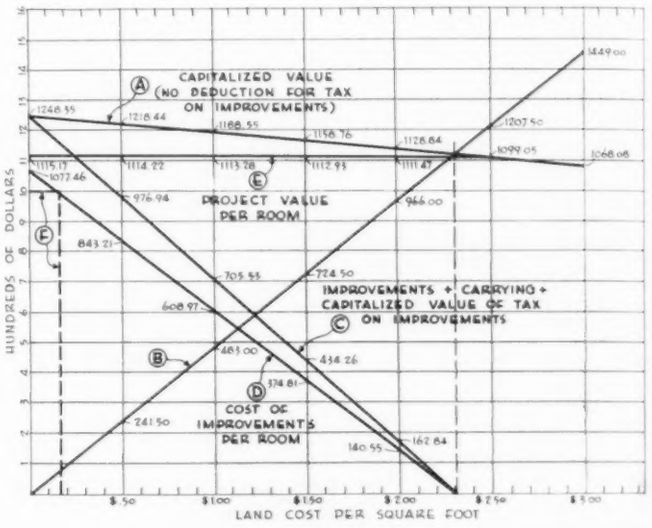
"My analysis is concerned first with variants in land cost and taxation. Unlike Example I, I am dealing with a low land cost, so I'll plat successive steps of 50 cents in land cost per sq. ft. instead of $1.00. Here, too, I'll work on the basis of a single room. The following tabulation results:

CASE	LAND PRICE PER SQ. FT.	PER ROOM (483 sq. ft.)	LAND TAX PER ROOM (0.9125%)
A	—	—	—
B	$0.50	$241.50	$2.20
C	1.00	483.00	4.41
D	1.50	724.50	6.61
E	2.00	966.00	8.82
F	2.50	1,207.50	11.02
G	3.00	1,449.00	13.23

"Again, the capitalization starts with obtainable rental, with allowances for vacancies, operating costs and reserves, followed by deductions for land taxes. (Taxes on improvements are considered later.)

"As proposed rentals are consistent with the market, not below it, my capitalization rate will not be as favorable as in the previous instance, but I can assume a 50-year economic life. Because the neighborhood is excellent I may assume the most favorable premise of declining income. My tables show a factor of 13.069 for income deferment of one year to which I add 50 per cent of a year's income discounted at 0.939. Here are the results:

	A	B	C	D	E	F	G
Rent per an. @ $12.75 p.m.	$153.00						
Less 10% vacancy equals..	137.70						
Less operating exp. $45.50	92.20	92.20	92.20	92.20	92.20	92.20	92.20
Land taxes (bldg. taxes later)	—	2.20	4.41	6.61	8.82	11.02	13.23
Bal. to be capitalized	92.20	90.00	87.79	85.59	83.38	81.18	78.97
Capitalization factor (6½% 50 yrs. "A" premise, 1 yr. deferment) 13.069 x balance	1,204.96	1,176.18	1,147.33	1,118.58	1,089.69	1,060.94	1,031.00
50% income x discount factor .939	43.39	42.26	41.22	40.18	39.15	38.11	37.08
Capitalized value (no deduction for bldg. tax)..	1,248.35	1,218.44	1,188.55	1,158.76	1,128.84	1,099.05	1,068.08



"Now I can start my graph, showing lines **A** and **B**, the capitalized results obtained and increasing land cost per room. Intersection of these two lines determines the point where land and land taxes absorb everything and nothing is left for improvements: approximately $2.30 per sq. ft. Again that curious anomaly: when land cost equals capitalized income, I can't build anything to earn that income!

"How much can I spend? First, let's deduct land cost. This gives me line **C**, a series of values composed of improvement cost, capitalized improvement tax and carrying charges.

"I now determine improvement cost, considering these three elements. Taxes on improvements per hundred dollars of cost are $0.9125. This is capitalized as follows:

6½%, "A" premise 50 yrs., 1 yr. deferment $0.9125 x 13.069 =	$11.93
Discounted income 1st yr., 0.9125 x ½ x 0.939 =	0.43
For each $100 Improvement Cost, deduct from capitalization P.R.	$12.36

"As $3.50 must be allowed for carrying charges for each $100 of building cost as well as $12.36 for capitalized taxes, the values determined on line **C** must be divided by 100 + 3.50 + 12.36 (115.86) to obtain improvement cost.

CASE	A	B	C	D	E
Amount on Line C	$1,248.35	$676.94	$705.55	$834.26	$162.81
Div. by 1.1586 equals	$1,077.46	$843.21	$608.97	$374.81	$140.55

"These values are shown on line **D**.

"Finally, to obtain project value we must add improvement cost, carrying charges of 3½ per cent and land cost.

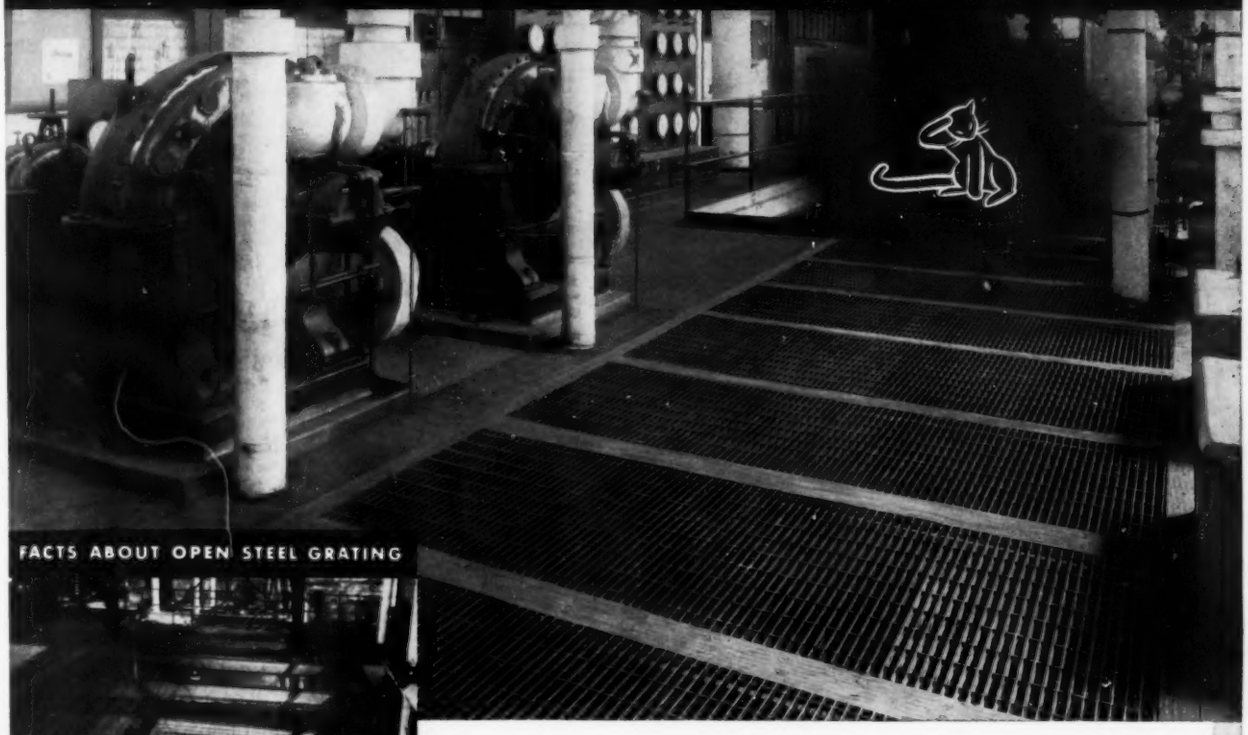
CASE	A	B	C	D	E
Improvement Cost	$1,077.46	$843.21	$608.97	$374.81	$140.55
Carrying Charges	37.71	29.51	21.31	13.12	4.92
Land Cost	.00	241.50	483.00	725.00	966.00
Project value P. R.	$1,115.17	$1,114.22	$1,113.28	$1,112.93	$1,111.47

"Line **E** is a plat of these amounts.

"My graph is now complete. Let's test improvement cost of $1000 per room. Line **F** shows me that a cost of $1000 is consonant with a maximum land cost of about 17 cents per square foot. As our land cost is only 11 cents per square foot we can do the project, in fact there appears to be about $25.00 per room leeway. We've got a job in the office!"

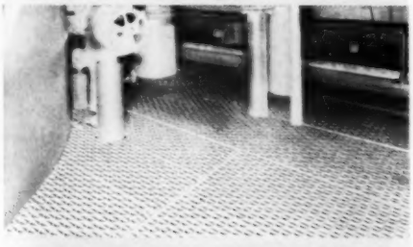
It will be noted that these analyses have been made without plans, without any reference to total area of the land and without any regard to the exact number of apartments, based only on very generalized assumptions of average room area. As stated before, it is only an approximation, but the method is valid and affords a rapid graphic means of testing variable factors between extreme limits.

THIS FLOOR CLEANS ITS OWN FACE



FACTS ABOUT OPEN STEEL GRATING

FREE CIRCULATION OF LIGHT AND AIR. Because of its construction, Open Steel Grating lets light through to spaces above and below—gives free ventilation and escape for fumes and gases.



ECONOMICALLY INSTALLED. Every section of Open Steel Grating is built to the requirements of the individual job. This factory layout insures speedy installation and perfect fit.

FLOORS of Open Steel Grating differ radically from ordinary, old-fashioned floors. They are factory fabricated from a combination of structural members rigidly connected by riveting, welding or interlocking. Though strong and rigid, their weight is the minimum necessary to carry and distribute a given load with an ample factor of safety.

Being open in construction, Open Steel Grating floors and steps do not accumulate dust, dirt, grease, oil or moisture on their bar edges. Used for outside walks, they do not collect snow, ice or water. *They are virtually self-cleaning—clean their own face.*

This self-cleaning feature is but one of the many you'll find in Open Steel Grating floors and steps. If you are confronted with a problem of securing rigid, durable, non-slip, firesafe floors that can be installed quickly—that will provide maximum air circulation, you'll find the answer, together with detailed specifications, in this new free booklet. Write today for your copy.

This seal is your assurance  *of a quality product*

OPEN STEEL FLOORING INSTITUTE, INC.

LIGHT WEIGHT. Every pound of material is used, with maximum efficiency to carry or distribute loads—meaning less dead weight lighter supports, reduced erection costs.

NON-SLIP SAFETY. Open steel gratings cannot accumulate skid-inducing substances—provides an even, non-slipping, stumble-proof surface.

Open Steel Flooring Institute, Inc.
Dept. A-5, American Bank Bldg.
Pittsburgh, Pennsylvania

Send me, without obligation, your new booklet, "New Ideas in Functional Floor Design."

Name .....

Address .....

City ..... *State* .....

NEWS OF MATERIALS AND EQUIPMENT

Flame-Proof Cotton Insulation

RESEARCH into new uses for the surplus cotton in the United States has produced a flame-proof insulating material, the fire-resistant qualities of which are obtained through a process which the manufacturer developed in collaboration with the U. S. Department of Agriculture. Other advantages stressed are the natural repellence of cotton to water, resiliency and extremely light weight. The material will be supplied in blanket rolls of various widths and thicknesses, which can be cut. It will be sold alone or with asphalt-impregnated paper backing, or in combination with reflective metal insulation, and the largest use is expected to be for walls, roofs and partitions of residential and industrial buildings. Five of the six types are produced in mounted form, with flanges for fastening to rafters, joists or studs of buildings. The flanges, according to the manufacturer, hold the cotton blankets in the center of the wall construction, providing space on either side for the circulation of air, which is said to increase the efficiency of the insulation in resisting heat and to provide for the dissipation of any condensation. Reynolds Metals Company, Richmond, Va.

Pre-Insulated Concrete Roof Deck

AN INSULATED concrete roof deck, laid up in one operation from pre-cast, pre-insulated concrete slabs is a recent development. The slab is made by inserting a 5/8-in.-thick backing of cane fibre insulation board, having a special asphalt treatment, into a steam jacketed mold for the concrete, which is vibrated at a high frequency, resulting in a high density slab with the insulation board bonded to the upper side. After laying in place on the roof beams, the joints are sealed with a mastic grout, and the insulated deck is ready for application of the built-up roofing. One such deck, 18,000 sq. ft., is said to have been exposed to the elements all during January 1941 without injury. Cemenstone Company, First National Bank Building, Pittsburgh, Pa. (See fig. 1.)

Figure 1

Self-Sanitizing Cement Contains Copper

RESULTS of a comprehensive investigation upon a new self-sanitizing cement, with applications in public health, and also as a floor surfacing in explosives plants, have been reported by *Dr. Michael A. Farrell*, head of the Department of Bacteriology at the Pennsylvania State College. This cement, developed at Mellon Institute, contains small amounts of copper and is said to have the ability to prevent the growth of molds and other micro-organisms on its surface. Although relatively insoluble, and washable, it is claimed the minute traces of copper compound that are put into solution when the cement is washed or dampened are sufficient to prevent the growth of micro-organisms. Its use in hospitals and food preparation rooms is indicated, also in shower and locker rooms and barracks.

The growing nuisance of contagious skin troubles, such as "athlete's foot," prompted Dr. Farrell to devote main attention to the molds held to be responsible. He found them particularly susceptible to the new copper-bearing cement and quickly killed by contact with it. The material can be spread in large areas over concrete or wood. While voltages used for lighting and power tools will not travel through it, it will drain away static charges and prevent their accumulation to sparking potentials. Moreover, it is claimed, it cannot give rise to "struck" sparks. These qualities adapt the new product to use as a floor surface where explosive or inflammable liquids are handled. H. H. Robertson Company, Pittsburgh, Pa.

New Steel Window Well

HEAVY gauge steel makes a new window well, recently announced. The well is reinforced by a steel rod welded to the top edge, and its smooth inside surface is designed to reflect the light and to remain sightly. It is claimed that the fill around the well does not have a tendency to pull the well away from the foundation. Straight and round types and different sizes. 20-year guarantee of replacement. Majestic Company, Huntington, Ind. (See figure 2.)

Figure 2

Wax-Fortified Maintenance Paints

A NEW LINE of maintenance paints for factories, hospitals and public buildings are impregnated with wax particles, producing a finish said to be difficult to mar and easy to clean. S. C. Johnson & Son, Inc., Racine, Wis.

(*Continued on page* 116)

ARCHITECTURE

BREVITY—in the opinion of the majority of the architects whose comments have appeared on these pages—is an attribute of the good advertisement. To advertisers, however, this view is not considered so much a recommendation to be followed as it is strong evidence that a large portion of the advertising pages in the architectural magazines are not doing a good job from the reader's standpoint. If they were, the readers would hardly be conscious of length.

The architect reads his journal of professional practice in order to keep himself informed. He is attentive to an article or advertisement only so long as it offers him something of value. He does not measure interesting news and useful information in terms of elapsed reading time. The advertisement with a tricky caption or other subterfuge will undoubtedly catch his eye—but it must produce something worth his time. Otherwise he will read just far enough to discover that the ad has nothing to say . . . and the result is resentment, not good will, toward the product advertised.

The good advertisement is useful; it talks in terms of the reader's problems and interests. It isn't brief and it isn't lengthy. It keep him interested and informed—for ten or a thousand words—right down to the last period. It is just long enough—and no longer. Such an advertisement serves both the architect and the advertiser.

—RONALD ALLWORK

ROBERT LEE CORSBIE, R.A.

"Specific, honest and accurate data"

THE PRINCIPAL PURPOSE of architectural advertising being to promote the use of building materials and appliances by architects, in my opinion advertising intended for architects could be much improved in interest and value by raising the standards of the advertising matter to a plane commensurate with the technical training of the architect. It has been my experience that advertising of an architectural nature prepared for the non-technically trained is not of much value to the architect—there are too many unanswered questions. Yet, it is not unusual to find the same advertising material used in architectural publications as in non-architectural magazines.

I believe architectural advertising could be greatly improved by, firstly, clearly and boldly illustrating a typical application of the materials or appliances, and showing details necessary to explain and call attention to special features; secondly, by concise copy which gives specific, honest and accurate data as to the nature of the product, its recommended uses, and pertinent facts relating to performance under test or in actual use; and, thirdly, giving comparative data on cost. This matter of cost is of great importance to architects today, especially as regards new materials. The commonly used statements "low in cost" and "economical in cost" are too often, and too late, found to have been misnomers.

BURTON ASHFORD BUGBEE

"Graphic suggestions to stimulate."

IN a Utopian world, architectural advertising would be unnecessary—all products and materials would be designed to architects' requirements; centralized, directed research would solve building problems for the profession.

But in our necessarily imperfect universe, the architect must select from what is on the market that which best meets his needs. Architectural advertising should, therefore, keep the architect informed of new products or new uses of materials in a direct, concise way. It obviously must be supplemented by the technical catalogue and the personal representative for specific data; but magazine advertising should contain graphic suggestions to stimulate the architect. The manufacturer who presents his material from a knowledge of the architect's problems will get the best response. The architect needs facts to prove claims of superiority, illustrations to show specific applications.

RICHARD BORING SNOW

"Arresting, poster-like simplicity . . ."

MANUFACTURERS would do well to remember that architects are highly trained in building technology and esthetics. This means that advertisements designed primarily to reiterate an established name in building products must be superlatively designed from the standpoint of layout, typography, clarity and simplicity. It also

MEETS ADVERTISING

. . . and practicing architects air their views on the type of advertising that will be most useful to them

means that advertisements designed primarily to publicize new techniques, products, or specification data must be patterned after a somewhat more sophisticated model than those addressed to housewives or cigarette smokers.

Crowded, busy pages, full of poor lettering, miscellaneous testimonials, starting with a picture of a draftsman in an eyeshade and ending with a half dozen thumbnail photographs of unrelated buildings, are sure to be flipped over in a hurry. On the other hand, a page presented with the arresting, poster-like simplicity of the recent Bethlehem Steel advertisements, or pages presenting the orderly marshalling of one or two pieces of definite technical information, such as the Byers Wrought Iron, or Holophane Lens pages in the April RECORD are apt to impress the mind of the architect with both a name and a future detail or specification item.

Advertisements which suggest new uses for known materials in really competent design or structural studies invariably attract the attention of the profession.

WALTER W. WEFFERLING

"Direct application, with photographs . . ."

ADVERTISING in architectural magazines differs from advertising on the radio, where the blah, blah, and the ballyhoo can be mentally tuned out without missing the feature, but magazine advertisements chucked full of technical data and ballyhoo will not even be tuned in, and the feature will be missed entirely.

Magazine advertisements can be both interesting and helpful, but only if clearly presented, showing direct application, with photographs or *good* illustrations, with much of the sales talk and technical data omitted, or, if it must be presented, it should be the second feature.

Advertisements presented in this manner will catch the eye instantly, and if the subject is applicable to a problem, it is sure to register in the mind of the architect. If this is accomplished, the rest should be easy. Then the technical data, the mechanics, the application and the cost will have their chance.

Presenting pictures entirely foreign, with a gold-plated "whatsis" may attract the eye, but not to the gold-plated "whatsis."

Send in Your Vote!

The FIBRE-TEX Company—which exists only in imagination—is, let's say, a manufacturer of wall board and fairly well known to the architectural profession. Let's assume further that the company is planning to run one of the three ads sketched at right. The advertising manager is debating which headline would most effectively capture and hold the interest of the architectural reader. How would you vote—and why?

Hugh I. Connet, Federal Adv. Agency

• FORMICA *for Theater Walls, Doors, Paneling..*

• Red Formica Box office paneling with black base and silver inlays at the Grand Theater, Cincinnati.

THEATERS are made more attractive by Formica sheets used for surfaces. This plastic material is very hard and durable, easily cleaned and maintained, and extremely colorful and decorative.

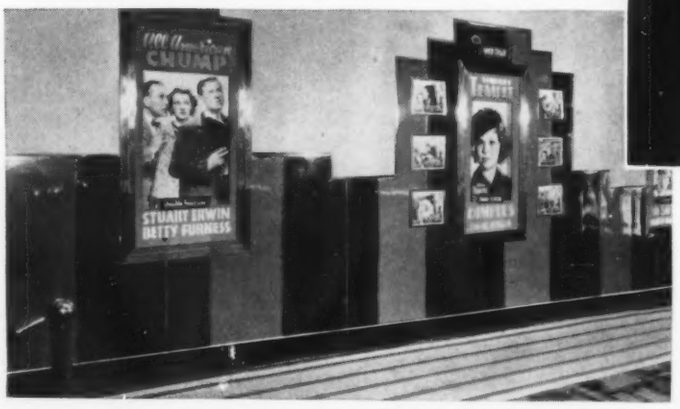
There are more than 70 colors, and inlays in color and metal make the widest variety of decoration possible. So striking theatrical effects have been attained with it by leading theatrical architects.

Formica is not brittle and will not chip or crack. It is inert chemically and will not spot or stain with ordinary cleaning solutions. It can be washed with soap and water or cleaned with alcohol or other solvents if that is necessary.

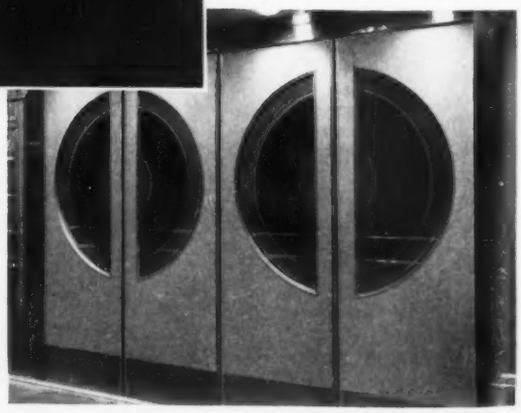
Once Formica has been installed the surfaces do not need to be refinished and maintenance is practically nothing for many years. In hundreds of fine new and in remodeled theaters Formica has been used for many purposes.

• Formica fluorescent panel which glows in "black light" behind a drinking fountain in the Farragut Theater, Brooklyn, N. Y. John & Drew Eberson, architects.

The Formica Insulation Co.
4620 Spring Grove Ave., Cincinnati, O.



• Lobby wall paneling is one of the effective uses of Formica in theaters.



• Formica doors of many colors and with elaborate inlays are available for theater entrances.

FORMICA

FOR FURNITURE AND FIXTURES

An Architect and Engineer

discusses

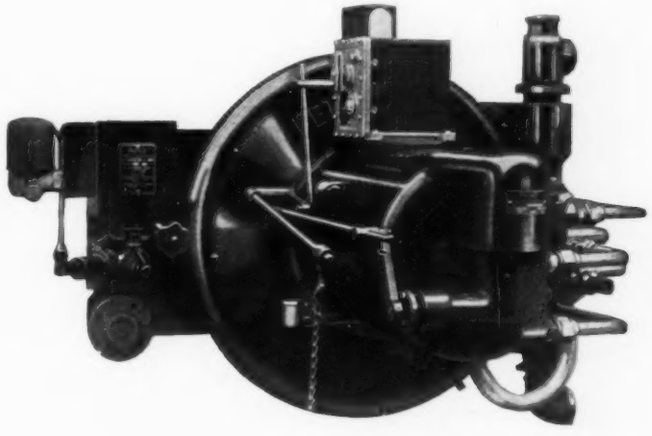
OIL BURNING SYSTEMS

G. Morton Wolfe, Architect & Engineer of Buffalo, has had wide experience in designing industrial plants and personally designs and supervises the heating systems installed. He has this to say about oil heating systems:

"Because of the most satisfactory results, low maintenance cost and high efficiency of the 500 H.P. heating plant I designed for the Houde Engineering Corporation in Buffalo, I did not hesitate to use Petro Industrial Burners for a 900 H.P. heating system just completed for a million dollar defense plant. The Houde installation was designed to be fully automatic, and in service has proven that such a plant can be installed with the use of Petro burners where less than 1 hour's attention is required during 24 hours continuous operation."

Mr. Wolfe mentions the scant attention required for continuously efficient operation of Petro Automatic systems. It is also true that under other circumstances which make Manual or Semi-automatic operation advisable, Petro equipment delivers correspondingly reliable performance. But when truly automatic firing is wanted the Petro Thermal Viscosity System for burning pre-heated fuel oils is the safe choice.

Thousands of such Petro systems are the best proof that the Thermal Viscosity System insures a wholly reliable operation that is Automatic (1) on "cold starts", (2) in adjustment to draft variations, (3) in meeting load fluctuations instantly, and (4) in accurately controlling the supply of oil to the burner at flow-rate and temperature correct for maximum efficiency.
In the Petro system no part of these four factors depends on human memory or vigilance, nor on frequent manual, mechanical adjustments.



CAPACITIES: to 145 gal. per hr.—487 boiler h.p.—68,000 sq. ft. steam E.D.R.

FOR FURTHER INFORMATION

SEE OUR CATALOG IN SWEET'S

Petro Industrial Burners for Automatic operation with pre-heated No. 6 oil, or with No. 5 or lighter oils, are available in eight sizes. Models W-2½ to W-9 inclusive. Each burner is a self contained assembly of motor, fan, pump, rotary cup atomizer and interlocked air and oil adjustments, except W-9 which requires separate pump.

In the use of preheated No. 6 oil, the Petro Thermal Viscosity System is an integral part of a Petro installation, insuring reliability of operation and fuel economy.

Semi-Automatic and Manually controlled Model W Burners and "Mechanical" type units are also available to meet circumstances which do not require automatic operation.

To the Architect in domestic building, Petro offers a complete line of burners for use with existing heating plants and complete oil fired boilers and winter air conditioners.

Petro's Engineering Division will gladly answer questions. The Petro Industrial Equipment Catalog will be sent promptly on request.

PETRO

Cuts Steam Costs

PETROLEUM HEAT AND POWER COMPANY

STAMFORD *—Makers of good Oil Burning Equipment since 1903—* **CONNECTICUT**

NEWS OF MATERIALS AND EQUIPMENT

(Continued from page 110)

Quicker Picnic Meals

DUBIOUS EFFICIENCY of outdoor fireplaces should be improved by the addition of a new unit offering a stove-top with two holes and lids, which is designed to be built into an exterior fireplace. It is constructed of angle iron with doors and frames of cast semi-steel and electrically welded joints. The bottom grate may be placed at different levels, for burning wood or charcoal. Overall dimension is approximately 20 by 26 by 15 in. Majestic Company, Huntington, Ind. (See figure 3.)

Figure 3

Photo Copies on Metal—No Darkroom

ESPECIALLY RECOMMENDED by the manufacturer to architects working on defense projects, where speed and perfect accuracy of reproduced plans are vital, is a new photo-sensitized metal having an aluminum base. With this metal, copies of drawings can be made by the usual contact printing method; or with an enlarger from an ordinary drawing, regular print or negative. It is claimed that distortion due to unequal expansion and contraction is eliminated. No dark room is required. Advantages listed for architects: will not tear or crack; moisture-proof; can be rolled like paper; will remain clear with no parts becoming illegible during entire job; makes an exact copy of the original to scale; additions or changes can easily be made to copy on metal. Republic Engineering Products, Inc., 430 Lexington Ave., N. Y. C.

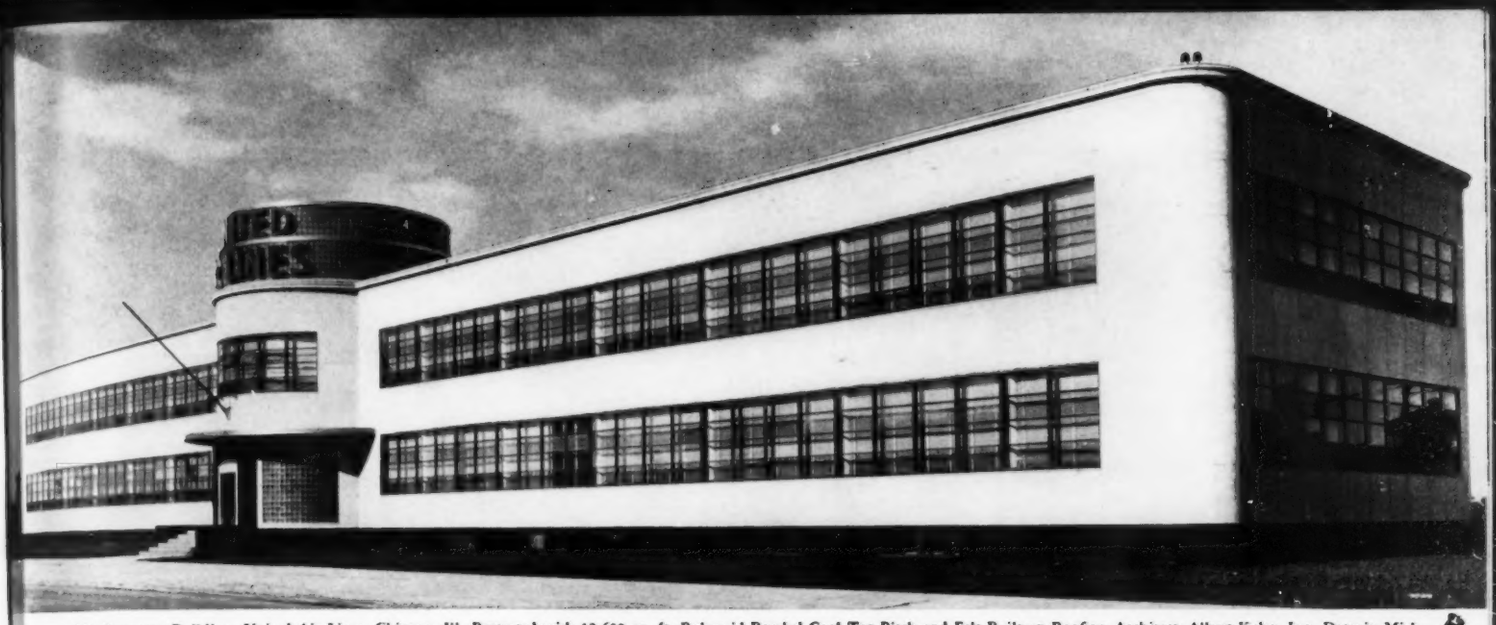
Cushion Top for Drafting Stool

SOFT SEATS for draftsmen are now available in the form of a one-piece sponge rubber cushion covered with corduroy, that fits like a cap over the top of a drafting stool. Major Marketers, Bonbright Building, Philadelphia, Pa.

Hangers for Lath—No Nails

PATENTED HANGERS are said to afford a quick way to apply 3/8-in. gypsum lath to walls without using nails, and to permit expansion and contraction without buckling or causing plaster to crack. V-W Company, 214 Oak Street, Columbus, Ohio.

(Continued on page 118)



Headquarters Building, United Air Lines, Chicago, Ill. Protected with 12,600 sq. ft. Ruberoid Bonded Coal Tar Pitch and Felt Built-up Roofing. Architect, Albert Kahn, Inc., Detroit, Mich.

Mainliner Trip 14
Chicago to New York
RU-BER-OID
all the way!

First leg of your journey—past the Headquarters Building of United Air Lines in Chicago. It's Ruberoid roofed!

To your plane—up—and eastward on your flight! You travel over cities and villages with countless residences, manufacturing plants and farm buildings—Ruberoid roofed!

And at the end of your journey—the Airlines Terminal in New York, also Ruberoid roofed!

Why are these buildings protected with Ruberoid roofs? Here are the reasons. Ruberoid is nationally known for its rigid standards of quality. Ruberoid roofs have achieved amazing performance records everywhere. Ruberoid has a full line of roofing products to meet the architect's specific needs.

Consider built-up roofs, for instance, which were used on the two Airline buildings illustrated on this page. Ruberoid makes all three major types of built-up roofs: (1) asbestos, (2) asphalt and (3) coal tar pitch and felt. Architects can choose not only the type, but the specifications best fitted for each job—because the specifications vary to meet problems caused by climate, fumes, fire hazards, etc.

You, as an architect, can solve your roofing problems with complete protection. Among Ruberoid's built-up specifications, are roofs which, when applied by approved roofing contractors, may be bonded for 10, 15 or 20 years, for *both* materials and workmanship.

When you have a job on the boards where roofing counsel is desired, call in a Ruberoid engineer. His services are free . . . his information unbiased. The Ruberoid line of roofing materials permits him to recommend the type custom-built to conditions.

For popular specifications, consult Sweet's. For complete specifications, write us on your letterhead. Address Dept. AR-5. Write today. The Ruberoid Co., *Executive Offices:* 500 Fifth Avenue, New York.

The Air Lines Terminal, New York, N. Y. Protected with 15,500 sq. ft. Ruberoid Bonded Asbestos Felt and Asphalt Built-up Roofing and 2,800 sq. ft. Ruberoid Bonded Coal Tar Pitch and Felt Built-up Roofing under Promenade Tile. Architect, John B. Peterkin, New York, N. Y.

RU-BER-OID
ROOFING AND BUILDING PRODUCTS

(Continued from page 116)

Porcelain Enameled Wall Panels

PORCELAIN enameled wall panels for bathrooms, in a range of six colors, are now offered. Advantages suggested by the manufacturer include fade-proof colors, cleanable surface, imperviousness to ordinary stains, and permanent finish. It is claimed the panels can be installed a whole sheet at a time by a competent workman without cutting, fitting, butting or special joinery. Compensation for inaccurate studding has been allowed for by means of a special lap-seam expansion joint. While the manufacturer anticipates greatest acceptance in apartments and group housing projects, the product can be adapted to individual bathroom designs at a cost said to be moderate. Green, yellow, blue, cream, black and white. Ingram - Richardson Manufacturing Company, Beaver Falls, Pa. (See figure 4.)

Figure 4

Twin-Unit Electric Water Heaters

FOUR new electric water heaters, in 30-, 40- and 50-gallon sizes, have been announced. The two smaller capacity heaters and one 50-gal. model have twin Calrod units, each thermostatically controlled. Insulated with rock wool an average of three inches thick, the tanks are galvanized copper bearing steel with 150 lbs. working pressure. The steel outer shell is finished in high-gloss baked-on white Glyptal with black base. The pressed steel tank supports, bottom cover and base legs are welded together. General Electric Co., Bridgeport, Conn.

Electric Door Opening Mechanism

"THE ARCHITECT WORKING IN COMMERCE" (AR 3/41, p. 58) may have use for information on electric door controls to open doors automatically to patrons or employes in stores, restaurants, apartment houses, hospitals, etc. One such control is a self-contained unit in a metal case, having a motor mechanism which opens the door to any pre-determined position. The unit can be energized by means of electric eye, push button, floor plate, pull cord or switches concealed in the hardware, or any type of contactor at a remote point. This control can be installed in connection with doors already in use. Miller, Carll & Lewin, Inc., 827 Arch Street, Philadelphia, Pa.

NEWS FROM WASHINGTON

(Continued from page 16)

money coming, efforts will probably be renewed to develop prefab more widely. *A. W. Stephens*, PBA expert who has been working on the problem, has been transferred to Carmody's office directly under the Administrator.

New FHA program

The bill to authorize $100 million in FHA insurance for privately financed defense housing became law last month and applications are beginning to come in. Under this new Title VI of the Federal Housing Act, loans up to 90 per cent of project cost can be insured on contractors' mortgages without waiting for the ultimate owners to take title.

Thus the defense workers can move in on a rental basis without putting up the 10 per cent down payment which they can accumulate through extra rent payments until they have enough equity to assume title. This type of insurance is restricted to areas where a defense emergency is officially recognized.

A bill to extend home modernization insurance under Title I of the Federal Housing Act has lagged in Congress but is expected to pass. Otherwise the Title would expire at the end of June and FHA financing would be restricted to new construction. The delay is attributed to red tape in the Budget Bureau, which has become a very powerful agency in recent months.

New price control set-up

Organization of the new Office of Price Administration and Civilian Supply, headed by *Leon Henderson* under the Office of Emergency Management, is for the moment little more than a continuation of work already being done, now under a fancier label with somewhat broader powers.

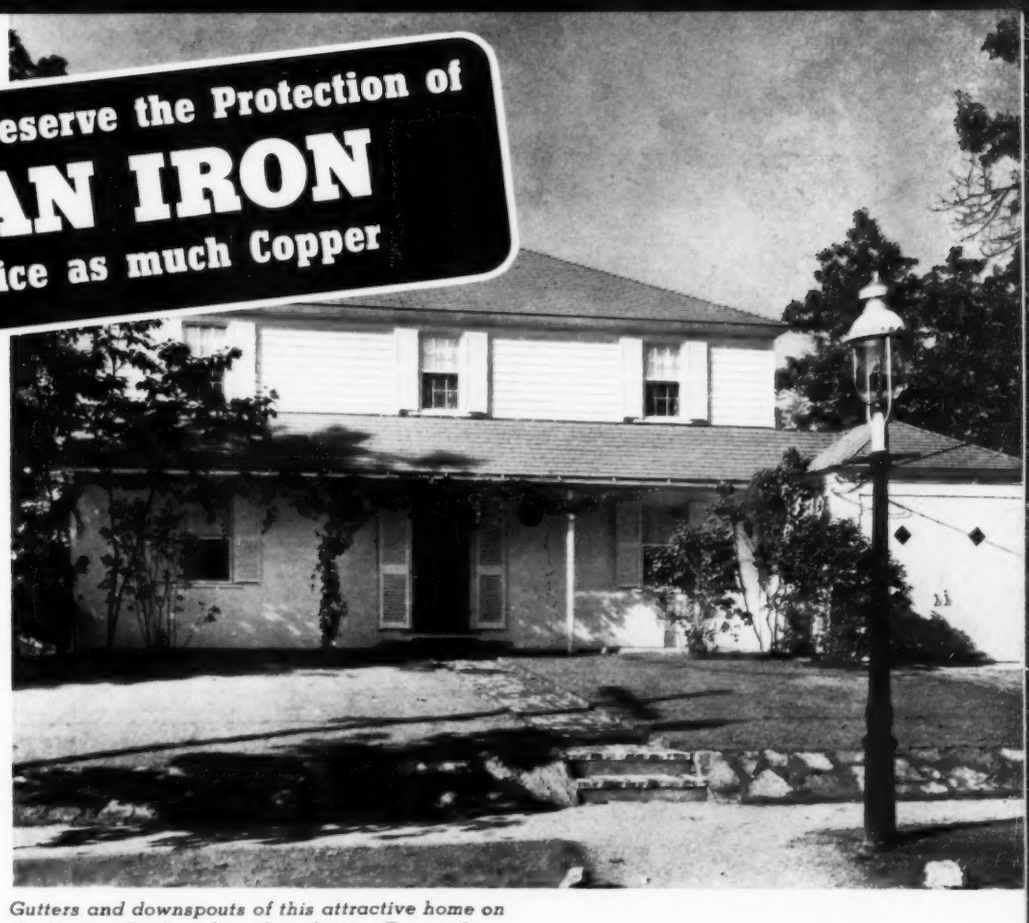
There is still no prospect in the immediate future of serious price rises or shortages of materials in the construction field. The lumber situation is quiet. After the purchase of 300,000,000 ft. for Army stock piles, it is believed that the supply is sufficient to prevent a shortage and a price rise with the continuation of the cantonment program. Officials doubt the necessity of similar stock piles for defense housing.

Plywood shortages may require official action. The scarcity of zinc is forcing discontinuance of yellow brass pipe manufacture. Aluminum for civilian purposes is virtually nil.

The steel situation is being watched. Experts think that the most now to be foreseen would be a price rise of not more than $2.00 per ton which, it is thought, could be absorbed to some extent by the fabricators so the price of construction steel in finished form would not advance materially. Priorities are being invoked on some

(Continued on page 122)

Small Homes, too, Deserve the Protection of TONCAN IRON it contains twice as much Copper



Gutters and downspouts of this attractive home on the Eastern Seaboard are long-lasting Toncan Iron.

IN THIS EMERGENCY

Paraphrasing an old operatic lyric—"A steelman's lot is not a happy one." When business is at low ebb, the struggle is to get enough tonnage to produce steel economically. When the tide of business swings to the other extreme, the big job we all have is to satisfy the customer who is unable to get all the steel he needs.

Believe me when I say that this is one time when the wheel that squeaks the loudest is not getting the grease. We are doing everything humanly possible to be helpful in this emergency and to be fair in the apportioning of our output—and to assist you further we are constantly setting new records in all our plants in our production of ***steel—first line of national defense.***

R. J. Wysor
PRESIDENT

Only a few dollars extra—an insignificant part of the total building cost—provide this home with the protection that Toncan* Iron sheet metal gives—protection against rust and corrosion. Every small home you design needs the protection of Toncan Iron—the exclusive Republic alloy *iron* that contains twice as much copper as the best copper-bearing steel available today. Long a time-tested favorite for both interior and exterior sheet metal work, it costs less per year of service and minimizes repairs and replacements.

Specify Toncan Iron for all sheet metal work. There is no better way to safeguard the building owner's investment. Our new Toncan Iron Booklet will give you all the reasons why. Copy on request, or see Sweet's Catalog.

REPUBLIC STEEL CORPORATION

General Offices: Cleveland, Ohio

BERGER MANUFACTURING DIVISION • CULVERT DIVISION • NILES STEEL PRODUCTS DIVISION
STEEL AND TUBES DIVISION • UNION DRAWN STEEL DIVISION • TRUSCON STEEL COMPANY

*Reg. U. S. Pat. Off.

REPUBLIC TONCAN IRON

An alloy of refined open-hearth iron, copper and molybdenum—*that grows old slowly*

NEWS FROM WASHINGTON

(Continued from page 120)

of the special alloy steels.

Congressional investigations

Congressional investigations of the defense programs are of concern to the construction industry and to architects engaged in defense work. With so much power delegated to the Executive, Congress has relatively little to do in the way of legislation but has assigned itself to the task of monitoring defense work.

In many respects, this can serve constructively in speeding parts of the program which might lag without this scrutiny and prodding. There is the danger, however, that isolated instances of waste and exorbitant profits, as in the investigations of work in World War I, may unfairly discredit the contractors and professional men who in the aggregate are doing everything that humanly could be expected. The result might be to strengthen the case for WPA and other Federal relief agencies which are trying to hold their function rather than let the normal course of contract work be resumed.

The three Congressional committees now active are showing judicial restraint in their approach to the problem. In the Senate, the special Truman Committee, after hearing general testimony, is expected to give special attention to defense construction. In the House, the Military and Naval Affairs Committees have appointed sub-groups to make studies in lieu of the Cox proposal for a special investigation which was rejected. Representative *Engel* of Michigan meanwhile has made a one-man investigation of work at Army camps and has energetically turned up evidence of delay, faulty planning, and poor construction practices which will scarcely be ignored in Congress.

Air raid precautions

The Army has gone to press with its first general pamphlet on air raid precautions, the first of several civil defense pamphlets to be distributed by the Division of State and Local Cooperation of the Council of National Defense. Copies may be secured from the Superintendent of Documents, Government Printing Office, under the title "Civil Defense Protective Construction."

The official release points out that this publication is by no means "a signal to start work immediately on any of the protective structures described." But the Army wants communities to be forehanded in their planning and to be ready "should the situation change."

Covering the weapons used in aerial attack and their effects, the pamphlet describes measures for the protection of buildings, utilities, and industrial plants, and the design of air raid shelters.

Carrara IS PRECISION-MADE FOR BEAUTY THAT ENDURES

EVERY piece of Carrara Structural Glass is mechanically ground and polished* to a true, flat surface. It is a finely-machined product, possessed of reflective qualities and depth of color impossible to achieve in any glass not precision-made. Carrara joints are smooth and without lippage. Carrara will not warp with time. It will not check, craze, stain, fade or absorb odors. Chemicals, moisture, pencil marks are powerless to harm it. It is easy to clean with a damp cloth. It stays young and new-looking through the years.

This is a quality structural glass, ideal for scores of architectural uses. Here are a few of them: toilet room walls and partitions, lobby and reception room walls, sill covers, niche linings, shelves. And the glass can be decorated by shading, fluting, sandblasting, etching, painting and laminating to create striking effects.

Write for our free booklet "Carrara, the Modern Structural Glass." It is full of facts and illustrations. Address Pittsburgh Plate Glass Co., 2096-1 Grant Building, Pittsburgh, Pa.

** The new Suede-finish Carrara has its surface reflections softened by a special treatment after grinding and polishing.*

"PITTSBURGH" stands for Quality Glass and Paint

Here is a reception lobby in an office building which shows the design possibilities of Carrara Glass. Ivory and Forest Green Carrara are used to create attractive, reflective walls. Note that Carrara can be bent, as at the end of the built-in divan. There are ten appealing Carrara colors to choose from.

CARRARA

The modern Structural Glass

PITTSBURGH PLATE GLASS COMPANY

TRENDS IN BRIEF

(Continued from page 20)

setts Institute of Technology points out, "We must not forget that we are not teaching style, but teaching students to think of the fundamentals of sound architecture: usefulness of the building, soundness of construction, beauty of the executed work."

Basic training for service and leadership in architectural practice is largely dependent, according to *Ralph G. Gulley*, head of the Department of Architecture at Rensselaer Polytechnic Institute, upon how clearly instructors visualize the present and potential function of architecture in its relation to a changing social order, and how well the architectural curriculum is geared to meet this relationship.

By far the largest part of the students in the Department of Architecture at Pennsylvania State College come from smaller communities, and only 12 per cent have moved to larger communities after graduation. If graduates are to return to communities where specialists are not available, they must return with a broad, well-balanced practical foundation. *B. Kenneth Johnstone*, head of the department, says "We are striving to balance the work in architectural design and structural design, while correlating both with more work than usual in building equipment, supervision, contracts, specifications, and estimating."

Business Spurs New Development

Portable ice rinks, once "impossible," now practical

THE opportunities afforded by a new form of entertainment—ice shows—and the lack of inexpensive rink facilities challenged the interest of *N. Taylor Todd*, an investment broker in Indianapolis.

He liked to skate, and to watch good skating; so did increasing numbers of people. Yet comparatively few ice rinks were available. Could portable, easily assembled rinks be designed? Todd sketched his ideas crudely and talked to refrigeration men. Most of them laughed. But one or two took him seriously, and on February 20 Todd's "Winterland Ice Revue, Inc." opened a successful show in Connersville, Ind.

The portable ice rink used consists of steel sections, each 19½ by 2 ft. by 3 in. high. Sections clamp together, side-by-side or end-to-end, are connected either to local brine supplies or a special portable, self-contained refrigerating unit, are sprayed with water, and are ready for use. Each section weighs only 500 lbs. empty, or 580 lbs. loaded with brine, and is cork-insulated. In design, new applications of recognized principles have entirely eliminated the expensive, heavy piping once considered essential. Rink sections can be set up anywhere—indoors or out; they can be installed on a dance floor without causing injury. Refrigerating machinery is driven by gasoline engines.